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1914

PROCEEDINGS

OF THE

Fifty-fifth Annual Meeting

OF THE

**STATE HORTICULTURAL
ASSOCIATION**

of Pennsylvania

HELD IN

York, Pa., January 20, 21, 22, 1914

**State Horticultural Association of Pennsylvania
Officers for 1914**

PRESIDENT.

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F. H. Fassett, Meshoppen.

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EXECUTIVE BOARD.

All of the above named officers.

STANDING COMMITTEES FOR 1914.

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Ralph Gibson, Williamsport.

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C. A. Wolfe, Aspers; H. F. Hershey, Harrisburg, R. 2; R. H. Bell, Williamsport;
G. W. Kessler, Tyrone.

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Dr. John P. Stewart, State College.

Membership in this committee is composed of one member from each county represented in the Association and such others as the chairman may request to assist him.

Membership and Expansion Committee.

One member from each county in the State showing horticultural activity.

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NAME.	POST OFFICE	COUNTY.
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Bartram, Frank N.,	1639 Race St., Philadelphia,	Philadelphia.
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Blaine, George W.,	North East,	Erie.
Bell, R. H.,	State College,	Centre.
Blessing, David S.,	4 N. Court St., Harrisburg,	Dauphin.
Boltz, Peter R.,	Lebanon,	Lebanon.
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Boyer, John F.,	Middleburg,	Snyder.
Blair, Charles P.,	Monaca,	Beaver.
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Brinton, S. L.,	West Chester,	Chester.
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Cooper, C. A.,	1000 Highland Ave., Coraopolis,	Allegheny.
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Creasy, Hon. Wm. T.,	Catawissa,	Columbia.
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Dickson, B. M.,	5711 Elgin Ave., Pittsburgh,	Allegheny.
Dill, Robert,	North East,	Erie.
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Dunlap, R. Bruce,	Walnut Bottom,	Cumberland.
Eldon, Robert M.,	Aspers,	Adams.
Engle, Enos B.,	Harrisburg,	Dauphin.
Engle, John G.,	Marietta,	Lancaster.
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Filbert, R. J.,	Fox Chase,	Philadelphia.
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Freed, A. J.,	Racine,	Beaver.
Freed, W. A.,	Racine,	Beaver.
Garrahan, R. H.,	Kingston,	Luzerne.
Garrettson, Eli P.,	Biglerville,	Adams.
Good, C. W.,	Waynesboro,	Franklin.
Griest, C. A.,	Guernsey,	Adams.
Griest, Frederick E.,	Santa Lucio, Oriente, Cuba,	
Grove, W. E.,	York Springs,	Adams.
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Hall, L. C.,	Avonia,	Erie.
Hartman, D. L.,	Little River, Fla.,	
Hartman, George R.,	Biglerville,	Adams.
Hartman, L. E.,	Etters,	York.
Hartman, Wm.,	Etters,	York.
Haverstick, Paul E.,	Lancaster,	Lancaster.
Hawkins, Chas. A.,	York,	York.
Heard, R. E.,	Buffalo, N. Y.,	
Hershey, H. F.,	Harrisburg,	Dauphin.
Hill, William D.,	North East,	Erie.
Hoopes, Abner,	West Chester,	Chester.
Hostetler, Abram,	Johnstown,	Cambria.
Huey, S. R.,	Newcastle,	Lawrence.
Huff, Burrell R.,	Greensburg,	Westmoreland.

NAME.	POST OFFICE	COUNTY.
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Johnston, Mrs. F. C.,	Dallas,	Luzerne.
Jones, J. F.,	Willow Street,	Lancaster.
Jones, S. Morris,	West Grove,	Chester.
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Kessler, Geo. W.,	Tyrone,	Blair.
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Landis, D. M.,	Lancaster, R. 1,	Lancaster.
Landis, Israel,	Lancaster,	Lancaster.
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Maffet, Miss M. A.,	264 S. Franklin St., Wilkes-Barre,	Luzerne.
Martin, J. O.,	Mercersburg,	Franklin.
Mayer, Guy S.,	Willow Street,	Lancaster.
Mayer, Dr. I. H.,	Willow Street,	Washington.
McClelland, J. B.,	Canonsburg,	Dauphin.
McCormick, James,	Harrisburg,	Dauphin.
McFarland, J. Horace,	Harrisburg,	Dauphin.
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McLanahan, J. King,	Hollidaysburg,	Blair.
Meehan, S. Mendelson,	Germantown,	Philadelphia.
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Metzger, Dr. A. H.,	Millersville,	Lancaster.
Mitchell, Ehrman B.,	Harrisburg,	Dauphin.
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Muller, Adolph,	Norristown,	Montgomery.
Myers, Levi M.,	Siddonsburg,	York.
O'Connor, Haldeman,	13 N. Front St., Harrisburg,	Dauphin.
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Pierce, H. W.,	Wilkes-Barre,	Luzerne.
Rankin, Chas. C.,	West Chester,	Chester.
Reist, John G.,	Mount Joy,	Lancaster.
Rick, John,	Reading,	Berks.
Rinehart, E. S.,	Mercersburg,	Franklin.
Roberts, Horace,	Moorestown, N. J.,	Erie.
Robinson, A. Blaine,	North East,	Cambria.
Rohde, Wm.,	Johnstown,	Huntingdon.
Runk, J. A.,	Huntingdon,	Greene.
Rush, Perry M.,	Sycamore, R. I.,	Bucks.
Satterthwaite, Fred'k G.,	Fallsington,	Wayne.
Searle, Alonzo T.,	Honesdale,	
Settemeyer, C. T.,	Wilmore,	
Shaffner, Jacob,	Harrisburg,	Dauphin.
Shallcross, Frank R.,	Frankford,	Philadelphia.
Shank, H. L.,	Lancaster, c/o Conestoga Stage,	Lancaster.
Sharpe, Miss E. M.,	Accotink, Va.,	
Smedley, Samuel L.,	2442 Bryn Mawr Ave., West Phila-	Philadelphia.
	Willow Street,	Lancaster.
Stem, Dr. J. C.,	Lemoyne,	Cumberland.
Stewart, Dr. J. P.,	State College,	Centre.
Strasbaugh, E. F.,	Orrtanna,	Adams.
Swank, Luke H.,	Johnstown,	Cambria.
Taylor, Ralph S.,	325 N. Matlack Ave., West Chester,	Chester.
Thomas, Chas. L.,	King of Prussia,	Montgomery.
Thomas, Edwin W.,	King of Prussia,	Montgomery.
Trexler, Harry C.,	Allentown,	Lehigh.
Tyson, Chester J.,	Flora Dale,	Adams.
Tyson, Edwin C.,	Flora Dale,	Adams.
Tyson, Wm. C.,	Guernsey,	Adams.
Van Deman, H. E.,	3630 13th St., N. W., Washington,	
	D. C.,	
Walton, Robert J.,	Hummelstown,	Dauphin.
Weaver, Abram,	Windber,	Somerset.
Weimer, E. A.,	Lebanon,	Lebanon.
Wertz, D. Maurice,	Waynesboro,	Franklin.
Wertz, Geo. M.,	Johnstown,	Cambria.

NAME.	POST OFFICE	COUNTY.
Westrick, F. A.,	Patton, R. 2,	Cambria.
Whisler, Edgar,	Etters, R. 1,	York.
White, Arthur H.,	Pulaski,	Lawrence.
Williams, Irvin C.,	Royersford,	Montgomery.
Wister, John C.,	Germantown,	Philadelphia.
Witherow, R. T.,	Punxsutawney,	Jefferson.
Wolfe, Chas. A.,	Aspers,	Adams.
Woods, Edward A.,	Frick Bldg., Pittsburgh,	Allegheny.
Youngs, L. G.,	North East,	Erie.

Annual Members

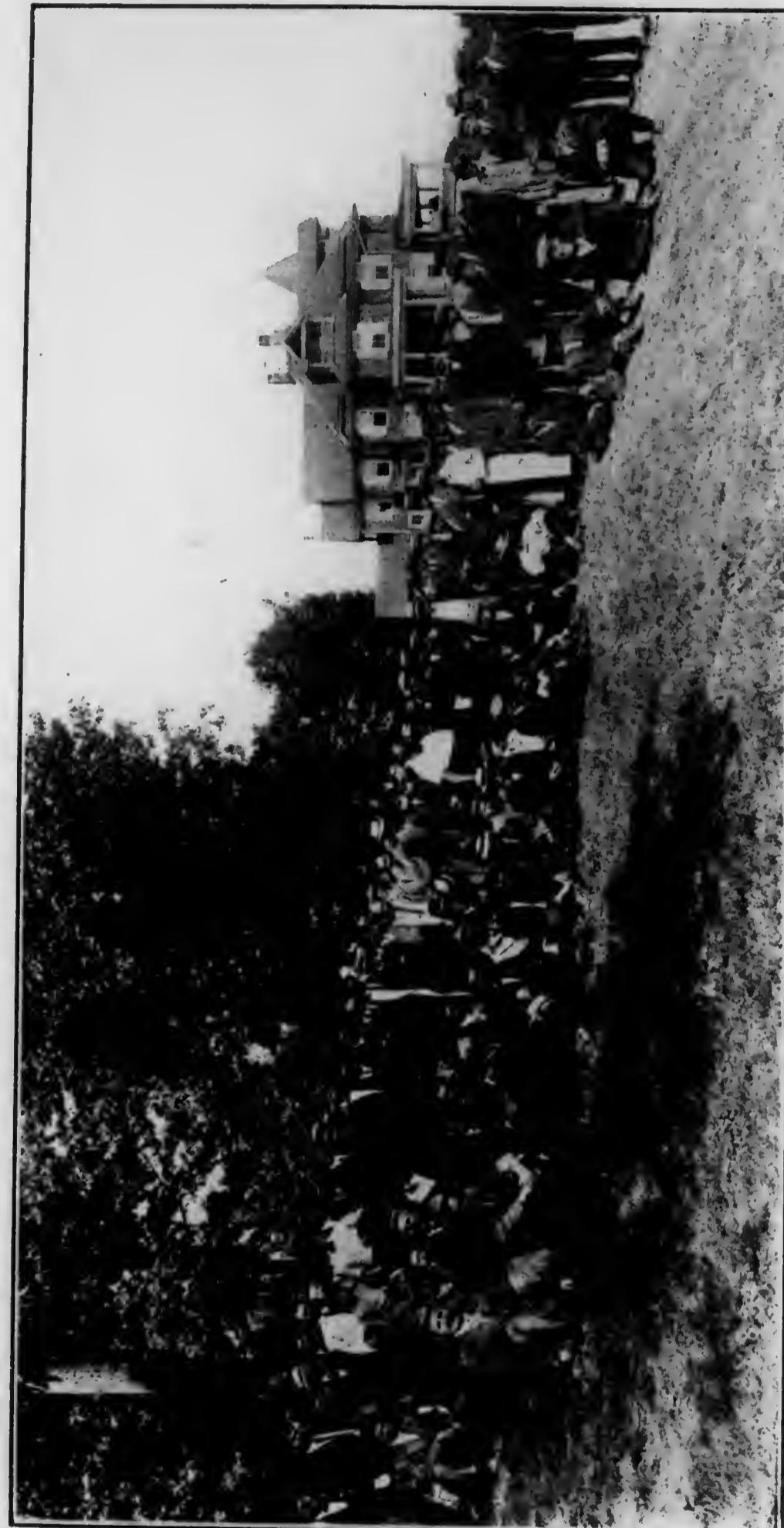
Acker, A. Norman,	Lionville,	Chester.
African Ostrich Farm & Feather Co.,	Harrisburg,	Dauphin.
Alleman, R. R.,	Camp Hill,	Cumberland.
Anderson, A. J.,	214 S. 12th St., Philadelphia,	Philadelphia.
Arthur, C. M.,	214 S. 12th St., Philadelphia,	Philadelphia.
Atwater, C. G.,	17 Battery Place, New York City,	.
Aurandt, J. J.,	Lewistown,	Mifflin.
Auten, C. L.,	West Chester,	Chester.
Backman, A. W.,	So. Langhorne,	Bucks.
Bailey, E. M.,	c/o McJunkin-Strate Co., Pittsb'gh,	Allegheny.
Baker, H. C.,	Tunkhannock,	Wyoming.
Banks, William,	Mifflintown,	Juniata.
Banard, C. P.,	Northbrook,	Chester.
Barnes, P. T.,	1726 Regina St., Harrisburg,	Dauphin.
Barnhart, Albert,	Anville,	Lebanon.
Bartram, Geo. H.,	West Chester, R. D.,	Chester.
Baugher, H. G.,	Aspers,	Adams.
Baughman, F. E.,	Manox,	Westmoreland.
Bayard, E. S.,	110 Shady Ave., Pittsburgh,	Allegheny.
Beaver, Geo. W.,	Middleburgh, R. 4,	Snyder.
Bechtel, J. R.,	State College,	Centre.
Behrhorst, C. E.,	417 7th Ave., Pittsburgh,	Allegheny.
Belt, J. E.,	Wellsville,	York.
Benn, M. L.,	Coudersport,	Potter.
Bergey, James,	Mifflintown,	Juniata.
Bitterman, J. W.,	325 Walnut St., Steelton,	Dauphin.
Bouton, Chas. S.,	Springdale, Ark.,	.
Botscheller, A. P.,	Dalton,	Lackawanna.
Bowers, E. C.,	East Petersburg,	Lancaster.
Boyd, J. C.,	Guy's Mills,	Crawford.
Bream, Samuel,	Biglerville,	Adams.
Briggs, J. S.,	Norristown,	Montgomery.
Brinton, Chas.,	Glenrose,	.
Brinton, H. C.,	Hanover,	York.
Brinton, William,	Timicula,	Chester.
Brooke, R. G.,	Schwenksville,	Montgomery.
Brown, H. H.,	Spring Valley, N. Y.	.
Brown, Wilbur J.,	1617 N. 52d St., Philadelphia,	Philadelphia.
Brown, Wm.,	2108 Myrtle St., Erie,	Erie.
Bruner, W. W.,	Paxtonville,	Snyder.
Brunjes, Howard F.,	Tunkhannock,	Wyoming.
Brunner, Chas. S.,	New Bloomfield,	Perry.
Bucher, F. S.,	6 W. King St., Lancaster,	Lancaster.
Bucher, Dr. I. Reily,	Lebanon,	Lebanon.
Bullock, W. A.,	Honesdale, R. 3,	Wayne.
Butt, J. L.,	Gettysburg,	York.
Card, Fred W.,	Sylvania,	Bradford.
Carrons, Robt. M.,	Washington,	Washington.
Chandler, W. H.,	Scranton,	Lackawanna.
Claar, William,	Queen,	Bedford.
Clark, R. L.,	Dillsburg,	York.
Clegg, Wm. S.,	New Bloomfield,	Perry.
Clouse, W. H.,	414 Shaw Ave., McKeesport,	Allegheny.
Clovis, A. E.,	Jollietown,	Greene.
Cocklin, J. A.,	Siddonsburg,	York.
Collins, Daniel J.,	Wawa,	Delaware.
Coursen, I. H.,	Wyoming,	Luzerne.
Cox, J. W.,	New Wilmington,	Delaware.
Criswell, Robert T.,	Chambersburg,	Franklin.

NAME.	POST OFFICE	COUNTY.
Crowell, Ralph T.,	3242 N. 13th St., Philadelphia,	Philadelphia.
Cumberland Nursery Co.,	Winchester, Tenn.,	.
Darby, R. U.,	804 Continental Bldg., Baltimore,	Md.
Deathers, C.,	Howard,	Centre.
Decker, Aaron,	Tunkhannock,	Wyoming.
Denlinger, Amos B.,	Strasburg, R. 1,	Lancaster.
Detweiler, D. W.,	Wrightsville, R. 1,	York.
Dickey, Samuel,	4 Chalmers Place, Chicago, Ill.,	.
Doan, John Lindley,	Ambler,	Montgomery.
Dulles, John W.,	West Chester,	Chester.
Dusman, W. F.,	Hanover,	York.
Ebert, Carl,	Holmesburg,	Philadelphia.
Edge, Samuel,	Jackson Center,	Mercer.
Ellsworth Farms,	Ellsworth,	Washington.
Estabrook, F. L.,	Athens,	Bradford.
Estabrook, H. S.,	Harford,	Susquehanna.
Evans, J. W.,	Spring Mills,	Centre.
Everhart, G. W.,	York,	York.
Fagan, F. N.,	State College,	Centre.
Felty, G. B. O.,	Millersville,	Lancaster.
Fenstermacher, P. S.,	Allentown,	Lehigh.
Fertig, F. R.,	Lebanon,	Lebanon.
Fielder, Henry,	Newtown Square,	Chester.
Finn, A. O.,	Clifford,	Susquehanna.
Fisher, M. O.,	Selinsgrove,	Snyder.
Ford, A. E.,	Glen Ridge,	Delaware.
Forry, L. S.,	Spring Grove,	York.
Foster, T. C.,	Lewisburg,	Union.
Frear, Edgar C.,	Factoryville,	Wyoming.
Funk, J. Keiffer,	Chewsville, Md.,	York.
Gable, A. P.,	Windsor, R. 1,	Centre.
Gardner, F. D.,	State College,	Adams.
Gardner, L. M., Jr.,	York Springs,	Dauphin.
Garver, H. B.,	137 E. Water St., Middletown,	Philadelphia.
General Chemical Co.,	712 Lafayette St., Philadelphia,	Lycoming.
Gibson, Ralph,	Williamsport,	Philadelphia.
Gidern, Geo. D.,	1722 Arch St., Philadelphia,	Washington.
Glass, S. J.,	Bulger,	York.
Goodling, D. B.,	Logansville,	Centre.
Gorham, Ray,	State College,	Montour.
Gottshall, U. S.,	Schwenksville,	Lancaster.
Graybill, I. B.,	Refton,	Allegheny.
Green, James, Jr.,	Creighton,	Cumberland.
Greishaber, J. A.,	West Fairview,	.
Grief Bros. Cooperage Co.,	1937 Wiley Ave., Cleveland, Ohio,	.
Griest, Geo. G.,	69 Forge St., Toronto, Canada,	Dauphin.
Gross, E. Z.,	119 Market St., Harrisburg,	Northampton.
Haase, Heinman,	133 Lafayette Av., Brooklyn, N. Y.,	Montgomery.
Haines, Miss Mary M.,	Cheltenham,	Northampton.
Hall, Robert W.,	Bethlehem,	Allegheny.
Harman, T. D., Jr.,	110 Shady Ave., Pittsburgh,	Columbia.
Harris, Frank C.,	Light Street, R. 1,	Northumberland.
Harris, Joseph,	Shamokin,	.
Harrison, J. G. & Sons,	Berlin, Md.,	.
Harrison, W. O.,	531 Wood St., Pittsburgh,	Allegheny.
Harvey, Frank L.,	Foxburg,	Clarion.
Harvey, H. R.,	Foxburg,	Clarion.
Hawkins, E. B.,	Delta,	York.
Hayman, Guy L.,	Northbrook,	Chester.
Hayward, Harry,	Newark, Del.,	Lebanon.
Heilman, J. R.,	Palmyra, R. 2,	Cameron.
Heilman, R. P.,	Emporium,	Lancaster.
Herr, David T.,	Lancaster, R. 7,	Lancaster.
Herr, Frank H.,	Millersville,	Lancaster.
Herr, John D.,	216 N. Duke, St., Lancaster,	Lancaster.
Hershey, C. A.,	Tillie,	Adams.
Hershey, H. S.,	East Petersburg,	Lancaster.
Hile, Anthony,	Curwensville,	Clearfield.
Hitz, Cyrus N.,	Hockersville,	Dauphin.
Hockman, H. E.,	Lock Haven,	Clinton.
Holdridge, F. L.,	Tidioute,	Warren.

NAME.	POST OFFICE	COUNTY.
Huff, B. P.,	Roanoke, Va.,	
Hummel, P. T.,	631 Maclay St., Harrisburg,	Dauphin.
Hutchins, E. A.,	Liverpool,	Perry.
Hyde, T. E.,	Bloomsburg,	Columbia.
Jacobs, Daniel Clarence,	Gettysburg, R. 5,	Adams.
Jaques, Mrs. David R.,	Haines H., Germantown,	Philadelphia.
Jaques, Mrs. Elizabeth H.,	Germantown,	Philadelphia.
Johnson, C. B.,	Warren, Box 82,	Warren.
Jones, J. H.,	Newport,	Perry.
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Kains, M. G.,	c/o Orange Judd Co., New York,	
Kane, J. A.,	Biglerville,	Adams.
Kauffman, Chas.,	Stony Creek,	York.
Kauffman, D. C.,	York, R. 1,	York.
Kauffman, E. F.,	York,	York.
Kauffman, J. Benj.,	York, R. 5,	York.
Keeney, A. C.,	Laceystown,	Wyoming.
Keller, Paul J.,	Gettysburg, R. 5,	Adams.
Keller, S. Clarence,	Gettysburg, R. 5,	Adams.
Kelly, W. J.,	State College,	Centre.
Kendig, Dr. J. D.,	Manheim,	Lancaster.
Kerr, S. W.,	Stony Creek Mills,	Berks.
Kibbler, C. P.,	572 Market St., York,	York.
Kitner, Joshua,	New Bloomfield,	Perry.
Klein, Lewis A.,	c/o U. of P., Phila.,	Philadelphia.
Kloss, D. S.,	Tyrone,	Blair.
Klussman, F. C.,	Millvale,	Allegheny.
Knouse, T. C.,	Benton, R. 3,	Columbia.
Knuppenburg, D. A.,	Lake Carey,	Wyoming.
Krebs, Harry B.,	Mercersburg,	Franklin.
Kunkel, Jonas,	New Ringgold,	Schuylkill.
Kunkel, N. J.,	New Ringgold,	Schuylkill.
Kusel, Dr. Geo.,	1831 Chestnut St., Philadelphia,	Philadelphia.
Larner, John B.,	1709 19th St., Washington, D. C.,	
Larson, C. W.,	State College,	Centre.
Laub, H. H., Jr.,	Lewistown,	Mifflin.
Lee, R. F.,	Hancock, Md.,	
Leighton, Jas. G.,	Tunkhannock,	Wyoming.
Leonard, F. E.,	New Kingston,	Cumberland.
Lerch, Fred,	Virginia, Minn.,	
Leslie, Wm. H.,	Arnold,	Westmoreland.
Levi, N. R.,	2243 N. 16th St., Philadelphia,	Philadelphia.
Lewis, W. J.,	Pittston,	Luzerne.
Lick, Simon,	Marysville,	Perry.
Linde, J. E.,	Orefield,	Lehigh.
Linville, Arthur S.,	Media, R. 2,	Chester.
Lippincot, J. E.,	Melrose Park, N. J.,	
Loose, H. H.,	Menges Mills,	York.
Loux, E. L.,	Souderton,	Montgomery.
Luke, W. J.,	Morganza,	Washington.
Lupp, R. H.,	Biglerville, R. 2,	Adams.
Lyon, Claude E.,	Emporium,	Cameron.
MacAskie, K. G.,	Brooklyn,	Susquehanna.
MacVeagh, Walter F.,	Williamsport,	Lycoming.
Maloney Bros. & Wells Co.,	Dansville, N. Y.,	
Markey, Elmer J.,	York, R. 2,	York.
Marshall, C. J.,	Harrisburg,	Dauphin.
Matten, J. P.,	Julian,	Centre.
Mayes, J. Will,	Howard,	Centre.
McCord, J. Fred,	Chadds Ford,	Chester.
McDowell, M. S.,	State College,	Centre.
McHenry, G. S.,	Benton,	Columbia.
McIlvaine, J. S., Jr.,	Fayetteville,	Franklin.
McLain, J. A.,	Allenport,	Washington.
McMurray, Levi A.,	Canonsburg, R. 4,	Washington.
Mechling, Edward A.,	Moorestown, N. J.,	
Messersmith, Milton G.,	York, R. 10,	York.
Mestea, H. J.,	Finleyville,	Washington.
Michoel, J. E.,	Norristown, R. 3,	Montgomery.
Michel, Henry F.,	518 Market St., Philadelphia,	Philadelphia.
Mickley, J. W.,	Fairfield,	Adams.

NAME.	POST OFFICE	COUNTY.
Miller, E. M.,	Hanover,	York.
Miller, Phillip,	Beaver Falls,	Beaver.
Minnick, D. W. & Bro.,	Chambersburg,	Franklin.
Minter, Mrs. D. G.,	Arendtsville,	Adams.
Moon, Jas. M.,	21 S. 12th St., Philadelphia,	Philadelphia.
Moon, R. Barclay,	Morrisville,	Berks.
Moore, B. S.,	Kulpstown,	Montgomery.
Moyer, H. B.,	Cape May City, N. J.,	
Mt. View Nursery Co.,	Williamsport, Md.,	
Murray, D. E.,	Catawissa,	Columbia.
Musgrave, John K.,	Camp Hill,	Cumberland.
Myers, C. E.,	State College,	Centre.
Myers, Walter F.,	York,	York.
Naginey, R. O.,	Milroy,	Mifflin.
Neal, H. C.,	Dravasburg,	Allegheny.
Neilson, John,	Trooper,	Montgomery.
Newcomer, W. S.,	Glen Rock,	York.
New Way Motor Co.,	Lansing, Mich.,	
Nissley, Walter B.,	State College,	Centre.
Noll, C. F.,	State College,	Centre.
Northrup, A. M.,	Ashley,	Luzerne.
Norton, W. C.,	Dalton,	Lackawanna.
Orrtanna Canning Co.,	Orrtanna,	Adams.
Orton, C. R.,	State College,	Centre.
Oyler, Geo.,	Gettysburg, R. 5,	Adams.
Palmer, Henry,	Avondale,	Chester.
Peachy, J. H.,	Belleville,	Mifflin.
Peirce, Ernest F.,	West Chester,	Chester.
Peirce, E. F.,	Swathmore,	Delaware.
Pennock, Mrs. A. J.,	Lansdowne,	Philadelphia.
Pershing, Theodore,	Pineville,	Bucks.
Philips, M. T.,	Pomeroy,	Chester.
Plank, H. K.,	Morgantown,	Berks.
Pratt, B. G.,	50 Church St., New York City,	
Prickett, J. W.,	Aspers,	Adams.
Purdy, H. L.,	Sunbury,	Northumberland.
Putney, F. S.,	State College,	Centre.
Pyle, Robert,	West Grove,	Chester.
Raffensperger, Chas. E.,	Arendtsville,	Adams.
Rakestraw, Thomas,	Kennet Square,	Chester.
Rorer, Erwin C.,	Glen Rock,	York.
Reichert, J. H.,	Womelsdorf,	York.
Reider, W. A. H.,	340 Chestnut St., Reading,	Berks.
Riddlesmoser, H. E.,	McKnightstown,	Adams.
Ridge, W. H.,	Trevose,	Bucks.
Rife, J. L.,	Camp Hill,	Cumberland.
Rinehart, Geo. W.,	York, R. 4,	York.
Rice, Daniel,	New Bloomfield,	Perry.
Rice, F. G.,	Monroetown,	Bradford.
Richards, A. C.,	Schellsburg,	Bedford.
Riberts, Arthur,	Gettysburg, R. 5,	Adams.
Rohland, Otto,	Narrowsburg, N. Y., R. 1,	Lancaster.
Root, J. W.,	Manheim,	Dauphin.
Rose, Wm. J.,	413 Market St., Harrisburg,	Bucks.
Rosenberger, Dr. J. M.,	Wycombe,	Lancaster.
Ruhl, Harry F.,	Manheim,	Dauphin.
Ruof, Frederick,	Hummelstown,	Centre.
Rupp, D. C.,	Shiremanstown,	Cumberland.
Rupp, H. D.,	Rupp Bldg., York,	York.
Rush, J. G.,	West Willow,	Lancaster.
Russel, N. W.,	Erie, R. 6,	Erie.
Sampson, H. A.,	Scranton,	Lackawanna.
Schell, Walter S.,	Harrisburg,	Dauphin.
Schwartz, Samuel,	Spring Grove,	Lancaster.
School of Horticulture for Women,	Ambler,	Montgomery.
Severson, B. O.,	State College,	Centre.
Sharon Fruit Farm,	Newport,	Perry.
Sharpless, John,	Avondale,	Chester.
Shaw, R. C.,	Stewartstown,	York.
Shay, M. E.,	Holmesburg,	Philadelphia.
Shearer, Walter J.,	Vinemont,	Berks.

NAME.	POST OFFICE	COUNTY.
Shellenberger, John H., ..	McAllisterville,	Juniata.
Shorb, Albert,	Hanover,	York.
Shuman, E. H.,	Hamburg,	Berks.
Seigfried, A. H.,	Selinsgrove,	Snyder.
Siebler, Franklin,	320 S. 44th St., Philadelphia,	Philadelphia.
Silvis, Bert W.,	Export, R. I.,	Westmoreland.
Smedley, Walter,	904 Stephen Girard Bldg., Phila.,	Philadelphia.
Smith, C. M.,	Lewistown,	Mifflin.
Smith, N. F.,	Dansville, N. Y.,	
Snavely, J. R.,	125 Liberty St., Harrisburg,	Dauphin.
Snyder, C. B.,	Ephrata, R. I.,	Lancaster.
Snyder, E. Bane,	Jacks Mountain,	Adams.
Snyder, T. S.,	Brodbucks,	York.
Sonneborn, Henry, Jr., ..	401 Chestnut St., Philadelphia,	Philadelphia.
Staley, R. M.,	Harrisburg,	Dauphin.
Stark, O. V.,	Nicholson,	Wyoming.
Stein, Geo. E.,	East Prospect,	York.
Stewart, Dr. J. P.,	State College,	Centre.
Stewart, Wm.,	Landisburg,	Perry.
Stickter, Geo. B.,	Pottsville,	Schuylkill.
Stitzer, Clyde E.,	Millmont,	Union.
Stover, F. S.,	Bowmansville,	Lancaster.
Strain, Thomas,	Cave Road, Merchantsville, N. J.,	
Strode, A. D.,	West Chester,	Chester.
Strode, Marshall D.,	West Chester,	Chester.
Strong, Geo. C.,	Orrtanna,	Adams.
Surface, H. A.,	Mechanicsburg,	Cumberland.
Taylor, B. C.,	Chester,	Delaware.
Taylor, Harry E.,	Chicora,	Butler.
Thomas, Carl B.,	West Chester,	Chester.
Thomas, Jackson M., ..	Emporium,	Cameron.
Thorpe, Francis Newton, ..	North East,	Erie.
Throne, S. E.,	York,	York.
Tomhave, W. H.,	State College,	Centre.
Tompkins, L. C.,	State College,	Centre.
Treible, C. E.,	Vosburg,	Wyoming.
Treible, O. M.,	Vosburg,	Wyoming.
Trox, Ralph L.,	Library,	Allegheny.
Trump, Geo.,	Muncy,	Lycoming.
Turk, Jesse C.,	Euclid,	Butler.
Tyson, A. R.,	Norristown,	Montgomery.
Van Norman, Geo. T., ..	Langhorne,	Bucks.
Vance, T. L.,	Warrenton, Va.,	
Vogel, Adam B.,	Lititz,	
Wadhwans, Miss Lydia F.,	275 Franklin St., Wilkes-Barre,	Luzerne.
Walter, Wm.,	Blairsville,	Indiana.
Waple, C. W.,	Tyrone,	Blair.
Warner, John W.,	Hatboro,	Montgomery.
Watts, R. L.,	State College,	Centre.
Weidner, A. J.,	Arendtsville,	Adams.
Weise, H. Benson,	Parkeburg,	Chester.
Wenger, J. K.,	Chambersburg,	Franklin.
Werner, Harvey O.,	State College,	Centre.
Wheat, John C.,	100 Hudson St., New York City,	
Wickersham, R. A.,	Mechanicsburg,	Cumberland.
Wilder, H. C.,	Bureau of Soils, Wash'ton, D. C.,	
Wiley, J. C.,	Bridgeton,	York.
Willson, J. C.,	Wallace Run,	Lycoming.
Wilson, Capt. J. L.,	Overbrook,	Philadelphia.
Windle, Francis,	West Chester,	Chester.
Wirt, Charles,	129 Cliveden Ave., Germantown,	Philadelphia.
Wolff, Dr. W. E.,	Arendtsville,	Adams.
Woolman, Anna,	21 N. Highland Ave., Lansdowne,	Delaware.
Work, Paul,	Ithaca, N. Y.,	
Wright, A. Cooper,	Hummelstown,	Dauphin.
Zimmerman, D. B.,	Somerset,	Somerset.



Summer Meeting, 1913, Assembled on Lawn of C. J. Tyson, Flora Dale.

CONSTITUTION.

ARTICLE 1.—*Name and Object.* The name of this organization shall be The State Horticultural Association of Pennsylvania. Its object shall be to foster and encourage the development of horticulture in the State of Pennsylvania.

ARTICLE 2.—*Membership.* Any person may become an Annual Member of this Association by paying two dollars (\$2.00) to the Secretary, such membership to expire on the first day of the following annual meeting, unless renewed. Any one paying twenty dollars (\$20.00) to the Secretary at one time shall be entitled to Life Membership. Persons of distinguished merit in horticulture may be elected to Honorary Membership for the *current year*, by a majority vote of the members present at any regular meeting.

ARTICLE 3.—*Officers.* The officers shall consist of a President, three Vice-Presidents, a Secretary and a Treasurer, all of whom shall be elected by ballot at each annual meeting, to hold office for one year or until their successors shall be chosen, except that the retiring Secretary shall edit the report of the annual meeting at which his successor is elected. No one may serve as President for more than two consecutive terms. These *elective* officers shall constitute an Executive Board in conjunction with an additional indeterminate number of Vice-Presidents whose names shall be announced by the Secretary at the annual election of officers. These Vice-Presidents shall be the regularly elected Presidents of any County Associations, organized in Pennsylvania for horticultural purposes, whose Constitution is approved by the Executive Board, and whose income from annual membership dues during the preceding year was not less than ten dollars (\$10.00). In order to secure admittance to this Board, the Secretary of such County Association shall certify to the Secretary of the State Association that the applicant has been duly elected to serve as their President for the current year and shall also submit a statement showing number of members and amount of dues paid for the preceding year. All officers must be members of the Association in good standing at the time of their election and shall assume their duties at the close of the meeting at which they were elected.

ARTICLE 4.—*Quorum.* Twenty-five (25) members of the Association and five (5) members of the Executive Board shall constitute a quorum for the transaction of business.

ARTICLE 5.—*Standing Committees.* The following Standing Committees shall be appointed by the President to serve during his term of office: A Committee on Legislation, to consist of three (3) members; a Committee on Exhibitions, to consist of five (5) members; a Committee on Membership, to consist of one (1) member from each county in the State showing evidence of horticultural activity, and a General Fruit Committee, consisting of one from

each county represented, with a general chairman of the whole, each member of the General Fruit Committee to have the privilege of appointing two assistants.

ARTICLE 6.—Annual Meeting. The Annual Meeting of this Association shall be held during the month of January in each year, at such time and place as the Executive Board shall determine. The regular meetings of the Association shall be closed to all persons, except paid-up members of the Association, speakers, delegates from associations outside of Pennsylvania, all ladies, and the minor sons of members.

ARTICLE 7.—Amendments to the Constitution. This Constitution may be amended by a two-thirds vote of the members present at any annual meeting, provided such amendment shall have been presented to the Secretary in writing at least sixty (60) days prior to time of holding the annual meeting, and by him referred to all members in connection with the announcement of said meeting.

BY-LAWS.

ARTICLE 1.—Duties of the President. The President shall be the executive officer of the Association and of the Executive Board, and shall preside at all meetings of either body designating one of the Vice-Presidents to serve in his stead when necessarily absent. He shall pass upon all bills and accounts of the Association before they are ordered paid by the Secretary; he shall appoint all delegates to other associations and all special and standing committees of the Association unless otherwise ordered.

ARTICLE 2.—Duties of Vice-Presidents. The Vice-Presidents shall serve on the Executive Board and any one of them may be called upon by the President or the Executive Board to assume the duties of the Chair at any meeting. They shall also actively represent the Association in its various lines of work in their respective counties.

ARTICLE 3.—Duties of the Secretary. The Secretary shall be the recording, corresponding and accounting officer of the Association and of the Executive Board; he shall incur no expenditure of a large or doubtful character without the sanction of the Business Committee; he shall secure the written approval of the President on all bills or claims against the Association before drawing his order on the Treasurer for the payment thereof; he shall attend all meetings of the Association and of the Executive Board and shall keep a faithful record of their proceedings; he shall sign all certificates of membership and all Diplomas and Certificates of Merit, awarded by the Association. All money received by him shall be promptly paid to the Treasurer. He shall have charge of the Association's books and papers and shall be responsible to the Board for all property placed in his charge; he shall be the cus-

todian of the Seal of the Association, and shall have authority to affix same to documents when needful; he shall seek by all suitable means to secure the fullest announcement of the meetings of the Association in this State, as well as in adjacent states, when such shall be found desirable. It shall also be his duty, yearly, to prepare for publication, the Annual Report of the Association, together with such other matter as he shall deem proper, he being aided in the selection of such matter by an advisory committee of the Executive Board. As recompense, the Secretary shall receive all necessary expenses, and such salary as may be determined by the Executive Board.

ARTICLE 4.—Duties of the Treasurer. All the funds of the Association shall be paid into the hands of the Treasurer; he shall disburse the moneys of the Association that shall come into his hands only upon order of the Secretary, countersigned by the President; he shall keep the moneys received by the Association for Life Memberships as a distinct fund, and shall invest the same under the advice and direction of the Executive Board, applying only the interest accruing thereon to the purpose of the general fund. Immediately upon assuming his office and before entering upon his duties, he shall execute to the Association an official bond with sufficient securities conditioned for the safe-keeping and disbursement of the moneys of the Association, and for the proper discharge of the further duties of his office, in such sum as shall be specified by the Executive Board, the premium on which shall be paid by the Association. This bond shall receive the approval of the President, and shall be deposited with the Secretary. Immediately preceding the annual meeting, he shall submit to the Executive Board a written report showing the amount of money that shall have come into his hands during the year, the sources from which it has been derived, and the deposition made of the same. This statement shall be published in the Annual Report of the Association.

ARTICLE 5.—Duties of the Executive Board. The Executive Board shall enact all rules and regulations for the management of the affairs of the Association, determine the salaries of its officers, and assume the control and management of its exhibitions; it shall have power to displace any officer of the Association for neglect of duty or abuse of position; shall fill all vacancies by appointment to continue until the next annual election; and shall hold at least two (2) regular sessions during the year, one of which shall occur at the time and place of the Annual Meeting of the Association. It may hold other meetings when called by the Secretary under the advice or direction of majority of the members of the Board at such times and places as may be deemed most convenient, but in all such cases, each member must be duly notified of the time, place, and object of such meeting; it shall carefully guard the interests of the Association, watch over its finances and provide for its necessities as they shall arise; it shall appoint from its own number three members, who shall constitute a Business Committee for the year, and upon which the Secretary and Treasurer may not serve; and it shall

submit to the Annual Meeting, through the Secretary, such report upon the condition, general interests and prospects of the Association as it shall judge necessary or expedient. All important measures shall be submitted to this Board, but may, by the Board, be re-submitted to the Association for recommendations.

ARTICLE 6.—Duties of the Business Committee. It shall be the duty of the Business Committee, upon application of the Secretary, during the recess of the Executive Board, to advise with him as to the expediency of making any contemplated but questionable expenditure for which occasion may arise during such recess. The Business Committee shall also audit the accounts of the Secretary and the Treasurer just prior to the annual meeting and submit written report of its findings to the Executive Board.

ARTICLE 7.—Duties of the Standing Committees. (1) The Committee on Legislation shall inform itself in regard to such existing laws as relate to the horticultural interests of the State and bring the same to the attention of the Association, at the same time reporting any additional legislation which in their judgment is desirable; when so directed by the Association, it shall cause to be introduced into the State Legislature such bills as may be deemed necessary and shall aid or oppose any bills introduced by others which directly or indirectly affect the interests of the fruit grower.

(2) The Committee on Exhibitions shall suggest from time to time such methods and improvements as may seem to them desirable in conducting the exhibitions of the Association, as well as other fruit exhibitions throughout the State, and with the assistance of the Executive Board, shall arrange the premium lists, and have charge of all the exhibitions of the Association.

(3) The Committee on Membership and Expansion, with the co-operation of the County Vice-Presidents, shall bring the work of the Association to the attention of fruit growers throughout the State, and by such means as they deem best, strive to increase the membership.

(4) The General Fruit Committee shall carefully and thoroughly investigate the subject of fruit culture in general. Each local committee of three shall collect such useful and interesting information in relation to the subject as may be in their power, and embody the same in monthly reports, to be made to the general chairman; such reports to be by him examined and embodied in his annual and semi-annual reports.

Such other Standing Committees may be created by the Executive Board from time to time, as in its discretion may seem desirable or necessary.

All Standing Committees shall report to the Annual Meeting in January, any information of value to the Association or its members, that may have come to their knowledge during the year, as well as any scientific theories, deductions or facts that in their opinion may be useful in advancing the object for which the Association is laboring.

ARTICLE 8.—Nomenclature. The Association shall adopt the nomenclature of the American Pomological Society.

ARTICLE 9.—Amendments to By-Laws. Amendments or additions to these By-Laws may be made by a majority vote of the Executive Board at any meeting, but if objection shall be made, the same shall "lie upon the table" till the next regular meeting of the Board. These By-Laws, or any one or more of them, may be suspended for the time, by order of a majority of all the members of the Association present and voting. A proposition in the general meeting of the Association for an amendment or addition to these By-Laws shall be referred to the Executive Board for consideration and decision but the Association may submit therewith its advice or request.

SUMMER MEETING

June 17 and 18, 1914

With the Department of Horticulture of the Pennsylvania State College, State College, Pa,

PROCEEDINGS
OF THE
FIFTY-FIFTH ANNUAL MEETING
OF THE
State Horticultural Association
of Pennsylvania
HELD AT
York, Pa., January 20, 21, 22, 1914

The Fifty-fifth Annual Meeting of the State Horticultural Association of Pennsylvania convened in the Court House, York, at 1:30 P. M., Tuesday, January 20, 1914, with President Creasy in the chair.

PRESIDENT'S ADDRESS.

Wm. T. Creasy, Catawissa.

To the Officers and Members of the State Horticultural Association of Pennsylvania:

It is with pleasure that I greet the fruit growers of the State at this the 55th Annual Meeting of the State Horticultural Association of Pennsylvania. The horticulturist, in growing fruit, has many things to contend with (conditions of soil, climate, insect pests, funguous diseases, etc.). The past year had the usual number of discouragements, but strange as it may seem, what was one man's loss was another man's gain, somewhat on the same footing as gambling. And in the last analysis, fruit growing is more or less of a gamble, some fruits more so than others. The past year in the lowlands, and some other sections in the State, the fruit was frozen, or severely damaged by very cold weather in May and June, so that an elevation of a few feet produced a crop, while lower elevations were failures. The prices of all the fruits, I believe, averaged higher than the previous year. The cellar stored apples are not keeping well, so that the cold storage apples are bringing and will bring very remunerative prices to the owners thereof.

The scale insect pests, and other diseases, are still with us. And fruit growing without spraying is a failure, or nearly so. Our advice is that those who do not, or can not spray, had better discon-

tinue the business. Pennsylvania is a great fruit State, no State in the Union produces better fruit than Pennsylvania, when it has the proper location and is properly cared for. In my last year's report I said that the census of 1909 showed that Pennsylvania ranked third in the production of apples, and that the average value of the fruit produced by each bearing apple tree in our State is 70 cents, so that it can be readily seen that of the eight million bearing trees in Pennsylvania we must have a tremendous lot that do not pay their keep. The value of the fruit produced on the bearing pear trees in our State is 45 cents, so of the nearly eight hundred thousand pear trees, one-half could be eliminated and then by proper attention we could still double the value per tree. The average value of the fruit of our bearing peach trees in our State is 57 cents, or nearly twice the average in the United States. These comparisons show that on the average our fruit business, in Pennsylvania, is not paying much, if any, profit. The future of the business in our State is more or less a guess, but we believe from the amount of trees planted in the last five or six years that there will be a tendency to over-production, should our orchards bear anything near a bumper crop. At present we do not have as many cold storage houses as we ought to have. Many of the smaller towns have very few apples on sale. Thousands of bushels could be used if there would be more and better places to store them.

This leads up to another question, and that is, there should be more co-operation in the fruit growing business, if we wish to make it a paying one. And in connection with this, the fruit growers in the different sections of the State should devise ways and means to use up their surplus and culled stock. In most instances this is wasted, because there are no available means to utilize them. With co-operative canneries, cider mills, evaporators, etc., this waste product would be turned into a profit, and I believe a market could be found for our vinegar thus made at some profit. This would give the people a pure, healthy, cider vinegar, in place of the cheap acid, patent vinegar now used by so many people with more or less damage to their health.

Another matter that should demand the attention of the orchardist, as well as the nurseryman, are the many diseased trees that have been planted the last few years. Thousands and thousands of trees affected with crown and root gall have been planted by the people of our State. I have given some attention to this disease and can prove by photographs taken by Professor D. E. Murray, fruit inspector of our State Department, that this disease makes the trees comparatively worthless. From my experience, I believe there are several kinds of crown and root gall, and we believe the time has come for our agricultural department to not permit the planting of trees affected with this disease. The nurserymen will then be more careful in the selection and treatment of their soil, as well as selecting the kind of roots, or seedlings used in budding or grafting.

P. J. Berckmans, ex-President of the American Pomological Society, has written: "Trees should be propagated from healthy and vigorous stocks, either by grafting or budding. The system of

grafting upon pieces of roots is wrong, to say the least, but as this is the cheapest and quickest method to manufacture trees, it is much resorted to by some nurserymen. No lasting results can possibly be expected from trees propagated upon this plan. They never form any but small, fibrous, hairlike roots, and when planted in the orchard, they require staking and seldom ever make a good tree. Several years ago I denounced this system as worthless—calculated only to disappoint the planter—and my opinion is substantiated by that of reliable cultivators. To obtain the object in view—longevity and fruitfulness—a tree should have for its basis a healthy stock, capable of penetrating the soil with strong roots, and an abundance of lateral roots to draw its nutrition."

The program prepared for this meeting is instructive and made up of our own people. On account of the lack of funds brought about by the vetoing of the appropriation given to the State Horticultural Association, we could not offer prizes for fruit or secure outside talent for this meeting. Just why the appropriation was vetoed by the Governor no one seems to know. The question for this Association to determine at this meeting is that of funds to carry on its work. This body could be made to be of immense value to the fruit growers of the State, in having exhibitions of the fruit grown. It would be one of the best advertisements for the fruit industry of this State. The National Apple Show, held at Spokane, Washington, last year, paid out \$15,000.00 in premiums and had on exhibition fifty-four carloads of apples. I would suggest that the Secretary of the Association—if funds are available—to secure a list of the apple growers of the State for the purpose of information for prospective buyers. The economic zoologist, and the State College, are doing good work. Our county horticultural associations are doing splendid work in some of the counties and more co-operative work is needed by these county associations along different lines of activity. We have already mentioned this co-operative work, and unless this is taken hold of in time, we will, in the near future, find ourselves with a big fruit crop on hand, with no plans, or system, to dispose of it to good advantage. Better grading, better packing, with such inspection and guarantees that the consumer will know what he is getting, is necessary.

Under the new rules of the Association, the presiding officer retires after serving two years. It is my wish that you show the same courtesy and good feeling toward your new President, as you have accorded the retiring officer.

York County is one of our leading fruit sections and is noted for its handsome red apples, and hospitable people. A profitable and instructive session is awaiting us.

WELCOME AND RESPONSE.

Hon. John P. Lafean, Mayor of York, addressed the meeting, extending a most cordial welcome to the members of the Association, wishing them much pleasure and profit in their visit to York.

Mr. Robert J. Walton, of Hummelstown, responded, and in a few well chosen words assured the mayor of our appreciation and acceptance.

FRUIT CONDITIONS IN PENNSYLVANIA.

By PROF. D. E. MURRAY, *Chairman General Fruit Committee, Catawissa, Pa.*

In writing this report, the chairman of the General Fruit Committee determined, so far as possible, to gather data and statistics which, when properly arranged, would not only give an approximately correct survey of the general conditions as regards yields and prices, but would at the same time cover those conditions which determine largely the success or failure of the fruit grower. With this end in view, a series of questions were prepared and sent out from which we received nearly a hundred per cent. replies. Right here it seems right to state that owing to a lack of money your chairman had not a penny at his disposal to get this information, but through the courtesy of Prof. H. A. Surface, State Zoologist, the information blanks were printed and sent out making this report possible. Here, too, I want to express my thanks to those loyal horticulturists, my correspondents, who so willingly and ably responded, not only answering the questions but following each with a letter full of the spirit of co-operation.

Pennsylvania, as a whole, lacks nothing to make her the greatest all-round fruit State in the Union. Nature has been lavish in her gifts and generous in her distribution. If we do not grasp these opportunities, or if we do not follow her directions we are from the necessity of things sufferers from the horticultural standpoint.

Our markets are the best; we are at their doors; if they are congested it is due to a lack of co-operation among the fruit growers. This is an economic problem which must be solved by this Association in conjunction with the various county or district organizations. Our proximity to the sea-board gives us every advantage in export trade. Why, then, should we not take advantage of these natural conditions and let the limit be one of production only?

Crop Varies.

The crop of apples in the State varied from two per cent. in Forrest County to seventy-five per cent in Bradford, Wyoming, Sullivan, Clinton and Lycoming, making a general average for the entire State of thirty per cent. It is interesting to note that in Forest County with a two per cent. crop of apples, little if any up-to-date orcharding, is practiced, and yet it is a fact that apples are the surest crop which can be raised; compare this with Bradford, Wyoming, Sullivan, Lycoming, Clinton and Bedford, with seventy-five per cent. crop; in these counties the most scientific methods are used. The story is easily told. Neglect more than climatic conditions is the cause. In every instance which has been reported to me and those cases which have come under my personal observation while traveling over the State, poor quality has been the result of poor practice. The time has gone by when we may expect to grow marketable fruit to our advantage financially without labor. Quality is spelled in the intelligent care given a tree. One gentleman in writing me stated that he has an orchard of three acres, the trees

being between thirty and thirty-five years old; from this orchard he never raised enough apples for his own use until five years ago when he came in contact with an enthusiastic inspector from the office of Prof. Surface. Since then he has sold apples enough to pay the original investment in his 160 acre farm. He further stated that those three acres in trees brought him more money than thirty acres in corn. This is but one of many such experiences which have come to my attention but all those men have been willing to give their orchards careful attention, recognizing in them a profitable investment. Sometimes we are very apt to lay at the door of Providence the result of our indolence. Nothing more beautiful could have been found in days of travel than could have been seen as you approach the home of our president, the Hon. William T. Creasy. Trees loaded with the most beautiful apples which graded Number 1. Hundreds of bushels sized and colored. Adjoining this orchard was another, the apples so poor as to make comparison ridiculous. In another valley, with the same character of soil, higher altitude, miles from the river, with every natural advantage, the owner did not get five bushels from over a hundred trees. I mention these cases to emphasize the fact that man, not nature is responsible for the large percentage of waste and loss. This part will be discussed later. The fact of quality always opens up the market at the highest price. This has been demonstrated repeatedly; Pennsylvania apples in competition with the apples of Oregon, Colorado and Washington is well known to most of you and that the price received was on an average of \$2.25 per box more may not be so generally known. Last year on the eastern market the quality of Pennsylvania apples was recognized to the extent of from fifty cents to a dollar a box more than either western or New York products. This Fall a gentleman of my acquaintance sold his entire crop in Cuba, receiving f. o. b. cars \$3.25 a barrel. In a later letter the buyer stated that he could have purchased western fruit cheaper but the quality was what he was after. Let me insist that we proceed to raise quality rather than quantity and I am sure that we will be surprised to find that we have both.

Buyers Numerous.

This year the prices have varied from 60 cents a cwt. to \$1.40; from 25 cents a bushel to \$1.25; from \$2 per barrel to \$5, and from 75 cents per box to \$2.50. Buyers were numerous and bid very eagerly against each other; in one instance from 60 cents per cwt. to \$1.70.

The most destructive pests of the apple tree and fruit are the following: Codling moth, borers, aphis, bud moth, leaf blister mite, San Jose scale, curculio, caterpillars, railroad worm, wooly aphis, oyster shell scale. Most if not all of which could have been prevented by spraying. One interesting experiment was carried out in spraying for the railroad maggot. Seven gallons of syrup, forty gallons of water and three pounds of lead arsenate were used about the 5th of June. Whether other measures taken the year before prevented the recurrence of the fly this year cannot be definitely determined but the fact is that whereas the year of 1912 we saw the

whole crop practically destroyed by the maggot, yet this last season less than one per cent. of the apples were destroyed. I have a firm belief that if proper attention is paid to this we will reduce this enemy to the same place as we have the scale and the codling moth.

The diseases which were the most destructive were the scab, brown rot, blight, collar blight, crown gall, and the so-called baldwin spot.

It has been demonstrated that those diseases which attack the fruit may be controlled by spraying with bordeaux or lime-sulphur, either self-boiled or diluted concentrate. The subject of blight, whether of apple or pear, has been one for much controversy; and while the specialists have been disputing among themselves, the practical orchardist has been using the saw and knife taking proper antiseptic measures with the result that he thinks he is getting the better of it. Crown gall is a disease of an insidious character; its results are in a great many instances slow about showing but sure in the end to the owner. I have personally made some investigation along this line and believe if the loss to the orchardist was known for just what it is we would be startled by the ravages of this disease; measures both efficient and effective must be taken. We know for a certainty that cutting off the gall and treating the roots antiseptically have not proven in the main satisfactory. Preventive measures may be taken in the handling of the young trees both before and after planting, care being taken that the roots are not injured.

As nearly as can be determined, planting in 1913 increased about five per cent. over 1912, my information being obtained from railroad agents of the various lines in a given territory; just why this increase in planting was the basis of an inquiry put to approximately 200 men; the answers resolved themselves into the one expression—demand for fruit. If these men were correct in their deductions then the question as to whether planting is being overdone can be answered in the negative. Besides these men I put the same question to twenty-five experts who are constantly in the field and in close touch with the fruit grower; the answers with but one exception were the same as the answers of the fruit growers themselves and the same reason given. There is little danger of overplanting with that view in mind simply because we all realize that the demands are becoming more critical with each year, with the result that quality will rule, other kinds being eliminated from the market. But in the planting of young orchards care should be taken to select those varieties which are most resistant to sudden climatic changes. A careful survey of the State shows that from Snyder County, west and south, the most resistant varieties were the Rome Beauty, Northern Spy, Baldwin, where grown; Tolman Sweet and Ben Davis; south and west, the most resistant were the Baldwins, Northern Spy, Greenings, Tolman Sweet, Ben Davis, Grimes Golden, Pewaukee; in that territory west of Huntington County there seems to have been no difference as to the power of resistance, except in two instances where the early varieties seem to have been the only ones to give crop. The Stayman Winesap in one instance, but this variety in Bedford County showed the strongest resistance, was dis-

astrosly injured April and May. The Jonathan wherever fruiting gave a good crop.

Results of Pruning.

The general concensus of opinion was to the effect that pruning had nothing whatever to do with the disturbance of the crop but on the other hand it was thought that proper pruning resulted in two things; first, the stronger development of the bud which had a strong tendency to resist any of the sudden changes which might take place in the spring, and second, the development of a quality which was superior. Where frost in May and April swept through a given territory destroying one variety or a whole orchard we found on careful examination that the soil conditions were practically the same but in nearly every instance the higher altitude escaped complete destruction with this one exception, that trees of the Winesap varieties, if planted in heavy soil, were largely destroyed. In several instances such as in Potter, Forest, Tioga, McKean, Lawrence, Mercer, Butler, Columbia, Northumberland and Montour Counties, very little damage was done by the April frosts, so far as could be determined but the May frost froze the little apples to such an extent as to destroy in some places the entire crop.

One of the peculiar conditions in the peach orchards of the State was that in a given territory, orchard after orchard was non-productive on account of the late April and May frosts, and yet these orchards, planted on the highest elevations, were frozen while trees in the lower land, in fact the lowest part of the farm seemed not to have been injured in the least—one of the paradoxes of horticultural science. Another feature which at first seemed peculiar was that in orchards of equal elevation the fruit of one was destroyed while that of the other was not damaged beyond thinning. On closer investigation it was found that where the same cultural methods were given the orchards bore the same ratio of crops. The best results seemed to have been gotten by a clean culture up to about the middle of June or the 1st of July, then cover cropped; late growths were checked, buds hardened, and the trees went into winter well seasoned; the following spring cultivation did not begin early and no nitrogenous fertilizer applied until the middle of May; pruning was also delayed, in some cases wholly neglected, with the result as I found it, some sort of a crop.

The data shows that there was about a fifteen to twenty per cent. crop of peaches, showing that the Elberta, Iron Mountain, Early Crawford, Champion, Lemon-Free and Smock to be the varieties which gave the best crop; a preponderance of opinion giving the record to the Elberta and the Champion as the strongest.

What to Plant.

The prices varied from 80 cents per basket to \$1.75, with an average of \$1.00. At this point it might be well for us to look for a moment just what varieties should be planted. If we follow the present plan of planting a number of different varieties we are almost certain to get some peaches, but does it pay to follow that system? Might we not better take those varieties which have

proven winners in our locality the past and especially the last two seasons, and plant of them? Some are induced to plant of the newer and earlier varieties, the argument being that the earlier varieties are placed on the market without competition from the orchards of the South, and as a result a better price is received. This may be true but the risk seems too great to place everything on it. My own personal observation leads me to say that during the past season it was not competition with the foreign fruit which lowered the price in our home markets, but rather that lack of co-operation of which I have spoken, which congested the markets and naturally the price fell.

The insects which were most harmful were the borer and curculio, with here and there reports of San Jose scale. These are enemies which can easily be eliminated as an economic factor in the peach orchard. I need not go over the whole subject of spraying but would state for our mutual benefit that the borer has been reduced to the minimum in orchards throughout the State by different means. One man reports to me that he controlled them by placing around his trees the fine siftings of coal ashes; quite a number have taken to spraying the trunks of the trees with a lime-sulphur solution (Sp. gravity 1.03), repeating several times during the season between June 10 and September 15, and claim immunity from the borers.

Among the diseases of the tree I found "Yellows" in the orchards of the State except the counties of Armstrong, Clarion, Monroe, Lancaster, Venango, Pike, Franklin, Blair, Bradford, Wyoming, Sullivan, Crawford and Juniata; throughout the balance of the State this disease is of greater or less importance. In its treatment there seems nothing else to do but to pull out and burn the infected trees. Leaf curl is reported from several counties; this condition should not exist. It is so easily controlled by spraying, just before the buds shove, with lime-sulphur full scale strength (1.03 sp. gr.) but so long as men will not spray there can be no other result. The opinion has gotten out among some men that the only reason we spray is for the control of the scale insects; let this be most emphatic that we spray for fruit, and though we may have no scale it pays to spray just the same; a great many reasons could be advanced for this statement. Brown Rot is the only disease of the peach which is controlled by spraying with bordeaux mixture 3-4-50 formula.

Pears seemed to have suffered by the late spring frosts nearly as much as apples. Fifty-two counties reported no pears at all to as high as an eighty per cent. crop, but generally it ran about a forty per cent. with a good yield of Keiffers, which brought on an average of 90 cents per bushel, while other varieties brought from \$1.25 to \$1.75 per bushel. Blight is the chief enemy of the pear tree and is destroying from fifteen per cent. to twenty per cent. of the trees per year. At this rate, if the information which I have secured is anywhere at all correct, we will be looking elsewhere for our better class of pears. The only remedy for this disease known at present is to cut out and apply an antiseptic wash to the wounds and then paint with white lead and linseed oil; this treatment to be effective must

be followed up with the greatest care, going through the orchard at least once a week. In view of this disease more Keiffers are being planted, they seeming to be more resistant to the disease.

The cherry crop, from what I have been able to gather, was but a ten per cent. one, and sold at an average of $12\frac{1}{2}$ cents per quart. The Yellow Spanish, Black Tartarian and the Napoleon Big arreau and Lullean being about the only sweet cherries to crop. Of sour cherries there was a sixty per cent. crop, the Early Richmond and the Montmorency being the heaviest bearers. The crop sold at an average price of 10 cents per quart.

Spring Frosts.

Raspberries and blackberries were about a twenty per cent. crop, owing first to the frosts of May and June and in the second place to cane blight. The crop sold well, averaging 15 cents per quart. There is no new planting being done to warrant a report along that line. Strawberries were a forty per cent. crop and sold well. There is ever a demand for this luscious fruit and the grower appreciates this in the more extensive planting, the Glen Mary Gandy and the William Belt being the favorites, with the Gandy leading in productiveness and in price received.

Plums were nearly all destroyed by the late Spring frost; they suffered as much, if not more, than the cherries, there being less than ten per cent. crop. The varieties most resistant were the Bradshaw, Lombard, Abundance, Wickson and the German Prune; prices ranged from 4 cents per quart box, to 10 cents,

I have not been able to get any definite statistics on the culture of grapes or nuts, two industries which we in Pennsylvania have neglected, permitting Erie County to represent us in grapes and C. K. Sober, of Lewisburg, and a few others to represent us in the culture of nuts. I saw grapes selling at 5 cents per pound with the demand greatly beyond our production. At the same time I saw hundreds of bushels of nuts sold by Sober at \$4 and \$5 per bushel, his grove yielding him in the neighborhood of 4,000 bushels. We recognize the fact that the weevil will put the chestnut grower out of business if he, the grower, does not put the weevil out. There is a conflict between an insect and an intelligent being, and I still have confidence in the intelligence of man if backed by a lot of industry.

My confidence in the intelligence of man right here seemed about shattered when we behold the waste in his orchards. Thousands of dollars going to waste which could easily be worked into vinegar and sold at a handsome profit, and then when I am told that he does not make vinegar because the storekeeper is afraid to buy it, I begin to feel slightly pessimistic. I won't make it because I cannot sell it! yet the market is offering from \$7 to \$8 a barrel for cider vinegar.

Pennsylvania is a great State, great in every particular. We have developed her various industries. Let us now place her on the horticultural map, leading in every line of our calling. It can be done.



Products to Market.



Fertility to the Farm.

Discussion on General Fruit Report.

Question.—Will you tell us again the age of the peach trees that proved most frost resistant?

Mr. Murray.—Four years old and over.

Question.—How would you get ahead of the frost?

Mr. Murray.—It was reported that orchards that were cultivated till late in the season had no fruit, while on those that were cultivated till mid-June and then stopped, provided trees were four years and older, there were peaches. Do not fertilize and begin cultivating too early. I am sure you can kill your crop by forcing too early.

Question.—What will be the crop next year in the orchards reported unpruned and uncultivated this year?

Mr. Murray.—The conditions look good at this time.

Dr. J. P. Stewart.—It is not safe to take the results of one year as conclusive evidence. Early Crawford escaped the frost this year in many places. That does not mean that it is necessarily a hardy peach. It is simply a question of the conditions in which the blossom is at the time of frost. The same is probably true of apples. It is a question with me whether the time of the frost with respect to condition of bloom did not have more to do with this matter than the treatment of the soil.

Mr. Murray.—Most of my correspondents stated that the peaches were in full bloom when the frosts came.

Prof. H. A. Surface.—What was the previous condition of the orchard that you reported uncultivated and pruned this year?

Mr. Murray.—Previously it was cultivated and pruned, which is the point to be made here.

Mr. P. S. Fenstermacher.—I want to make a strong point of keeping the peach orchard up out of the low ground and pockets. I am sure it is most important. You cannot be sure of a crop unless you do this.

THE CULTURE OF BUSH FRUITS.

PROF. W. B. NISSLEY, State College.

The growing of bush or small fruits such as strawberries, raspberries, blackberries, currants, and gooseberries, has been neglected to some extent by Pennsylvania growers. The opportunities in this State are much greater than one at first realizes. Here we

are in Pennsylvania with between six and seven million people within its boundaries, with New York next with about nine million population, together making about one-sixth of the population of the United States. In fact we have the best markets in the world at our doors. One might say that our perishable bush fruits cannot be shipped to other than local markets, yet if Oregon is selling strawberries on the Chicago markets and Florida is selling strawberries in Pennsylvania and New York, we can surely reach almost any part of Pennsylvania with the perishable small fruits under modern means of transportation.

The soils in Pennsylvania in general could not be improved upon for the production of our small fruits, which accounts for them growing wild over our hillsides. If one will study the markets of our large cities and especially those of our smaller ones, one will find that the supply is very limited in proportion to the demand. I am glad to say, however, that the growing of small fruits has increased in extent and has greatly improved in methods during the past few years, probably due in part to better shipping facilities, improved varieties, and a better knowledge of growing and handling the crop. The labor is light, the investment need not be large, the returns are quick, and no other crops are *more certain*. The most important things to be remembered in producing small fruits are to locate where you are reasonably safe from killing frosts, where moderate priced labor of the proper kind may be available at certain seasons of the year, and be convenient to a local market or shipping point.

Probably one reason why the small fruit industry is not very popular is on account of the care that should be given the plantation during all seasons of the year. Many growers are apt to neglect pruning or culture at some time or other which will soon spell failure.

I will confine myself to raspberries, blackberries, currants, and gooseberries, and omit strawberries at this time, as that is a very important subject in itself and cannot be justly treated with the rest. Raspberries (both red and black) and blackberries can be treated together under the bramble fruits, and in planting bramble fruits the first thing to be considered is the location or site, and the soil. It might be said in a few words that land that will produce good farm crops will produce bush fruits. The soil does not need to be very rich as many people suppose, in fact too rich a soil is not the best as the growth will go to stalk at the expense of fruiting. A well drained soil is very important yet not a dry soil. The soil should have enough humus in it to hold moisture a long time. One will find that the wild berries do best where they are grown in partly shaded conditions, thus dry soils and the direct or burning rays of the sun are injurious or tend to produce small, dry, withered berries. Gentle slopes are very good provided the soils are not too dry or sun's rays too direct, the air is usually very good on the slopes while in the bottom the soils are usually richer but frosts are more likely to settle. Red raspberries will ordinarily prefer the lighter soils that are not too rich, while the black varieties and blackberries prefer deeper, richer soils, and are also heavier feeders.

Stable manure is undoubtedly the best fertilizer as humus must be incorporated in the soil to hold the moisture or a mulch of some kind must be maintained. If manure is used no nitrogen fertilizer need be applied. One should also watch that too much nitrogen is not applied in the manure, especially with red raspberries. Black raspberries are heavier feeders and will stand more nitrogen. Very little commercial fertilizer need be applied. Potash seems to be the important element next to nitrogen. A good proportion is as follows: potash 100 lbs. per acre in the form of muriate or sulphate of potash, or wood ashes may also be used. Cover crops or manure for nitrogen, or if these are not used, 100 lbs. of nitrate of soda or 125 lbs. of dried blood. For phosphoric acid 250 lbs. of floats or 150 lbs. of acid phosphate per acre. These amounts can be varied according to soil conditions. But it can be readily seen that the application should not be too heavy.

Red raspberries are self propagating by means of shoots or suckers that may be reset when young. Never pull the young plants up, as they are sure to break off, but dig them. They may be planted in rows or hills; when planted in rows they are usually placed three feet apart in the row, with the rows five feet apart, and when set in hills they are usually planted 4x4 or 5x5 feet. Great care must be taken to keep the excess suckers destroyed either with a hoe or cultivator. If this is neglected the stalks will grow too spindly and will not fruit. Blackberries are ordinarily propagated in the same manner as red raspberries. Black raspberries are propagated by tip layering. The top or the whole cane may be buried, depending upon the number of plants desired. The small stalks may be planted during the Fall or Spring, but it is preferable to heel them in and protect them over Winter and plant them early in the Spring.

The pruning problem is an important one. With black raspberries, and blackberries, the young shoots that come up in the Spring should be tipped when about thirty inches high; in black raspberries four or five feet, in blackberries so that laterals will grow the same season. The next Spring these laterals should be cut off from eight to twelve, or fourteen inches from the stalk; this will make a stiff support for bearing the fruit, which will be borne on the laterals. Then after fruiting, cut out the old canes close to the ground and burn them so as to prevent the spread of disease, etc.

One must remember that in bush fruits the stalk is grown, it fruits the next year and then it is useless. With red raspberries it is a question whether the young cane should be topped or not. Most growers do not summer prune this type as it has a tendency to produce more suckers when tipped, and the laterals do not mature sufficiently in the fall to winter over properly. With red raspberries the important prunings are to keep down the excess suckers and cut out the old canes after fruiting.

Constant tillage from early spring until fall must not be overlooked; this is all important for several reasons: (1) For conserving moisture. This is very important about the time the berries are enlarging and ripening. (2) For releasing plant food, or making

the fertilizing elements in the soil more easily available to the plant. (3) For destroying suckers in the case of the red varieties.

A raspberry or blackberry plantation will be profitable as long as you take proper care of it, ordinarily they are renewed at from four to eight years, due to disease and insects becoming troublesome. Yet they may last for twelve to fifteen years.

Currants and gooseberries are very similar in all respects; hence can be treated together. They will grow on poor soil, but will respond very quickly to good treatment and to be profitable should be on a fairly rich soil, rather heavier than for raspberries. They are heavy feeders, hence will require a heavier application of fertilizer of the same nature as raspberries. They can be propagated most conveniently by taking hard wood cutting six to eight inches long, of well seasoned one-year-old wood in the fall. These are buried several inches deep with the large end up in order to callus or heal over properly. They may then be planted or stored away in damp saw dust or sand, and under low temperature until spring, when they should be planted early. Prune so as to leave from six to eight, or sometimes more stems, to a stalk, and practice a gradual renewal of the plant. In this way the plantation should be good for eight to twelve years. They are very hardy and will endure the most severe winters.

All persons growing small fruits are especially interested in the returns. A good yield from a well cared for acre of red raspberries should be 140 bushels, or 4,480 quarts, at twelve cents a quart would amount to \$537.60.

Black raspberries, 150 bushels, 4,800 quarts at twelve cents, is \$576.00.

Currants, 350 bushels, 11,200 quarts at twelve cents, is \$1,-344.00.

Gooseberries, 400 bushels, 11,200 quarts at twelve cents, is \$1,-536.00.

If twelve cents a quart is too high for some localities, estimate at ten cents, or even eight cents a quart, and the returns will still be quite large.

Last year large canneries paid \$100 a ton for currants and gooseberries, which is about ten cents a quart, wholesale.

The harvesting problem is the difficult one and in the case of gooseberries a cranberry picker would be a great labor saving device.

Varieties to be planted will depend upon your particular condition with particular reference to climate, soil and market.

The most profitable varieties, under general conditions, are as follows:

Red Raspberries.—Cuthebert, Columbian, Loudon, and Marlboro.

Black Raspberries.—Cumberland, Gregg, Kansas, Eureka, Conrath, Mammoth Cluster, and Older.

Blackberries.—Snyder, Taylor, Agawam, Eldorado, Rathbun, Erie, and Early Harvest.

Currants.—Red Cross, Perfection, Victoria, Fay Prolific, Pamona, Versailles, and Cherry.

Gooseberries.—Downing, Houghton, Columbus, Chataqua, and Industry.

Discussion on Mr. Nissley's Paper.

Question.—Do red raspberry stalks deteriorate as quickly as black ones?

Mr. Nissley.—Not if they are kept from getting too thick. If they get too thick they will soon go down.

Mr. E. B. Engle.—A grower in the northern part of the State is growing red raspberries in stool clusters, fifteen to twenty canes to the stool. He has the stools far enough to cultivate both ways, and it seems to work very well.

Dr. Mayer.—How many canes of red raspberry should there be to a yard of running row?

Mr. Nissley.—I should say about four to the yard.

Mr. Creasy.—Is there money in gooseberries?

Mr. Nissley.—Where you have a market, I should say they are quite profitable.

Mr. Engle.—Erie County is the great gooseberry field of the State. They are grown there in very large quantities, and large buyers go there after them. They are decidedly profitable.

Question.—What are the chief uses of gooseberries?

Prof. S. B. Heiges.—They are used chiefly as the base of fruit juices furnishing the acids to which various fruit flavors are afterward added.

Prof. H. A. Surface.—Do you recommend the use of bush fruits as fillers in an apple orchard?

Mr. Nissley.—Some of them do well in the young orchard, but owing to the tendency to crown gall, I consider it a doubtful practice.

Mr. Samuel Swartz.—How do you avoid too many shoots in red raspberries? Would it be practical to plow deep between the rows to avoid root sprouting?

Dr. Mayer.—That would be pretty risky.

Prof. Heiges.—It is no trouble to keep out superfluous sprouts. I use a narrow hoe and cut them right out. In regard to black-caps, I let them get to be four or five feet high before I pinch off the tips.

A Member.—A good deal is said about Eldorado blackberry. I live in the northern part of the State and get good cane growth, but in fruiting it is a failure with me.

Mr. Engle.—Western Triumph is a good one in the western part of the State. It is hardy, free from disease, a good bearer and in great demand where it is known.

ORNAMENTAL PLANTING FOR THE FARM HOME.

JAMES M. MOON, President, *Wm. H. Moon Company, Morrisville.*

Coming here as a substitute and on short notice, I have no set speech to deliver, but want to talk to you in a social manner regarding the Ornamental Planting for the Farm Home. I went around to the library to see what books were there, which would likely enlighten me concerning this topic. Of course, among the first I noticed were Downing's *Landscape Gardening*, one of the oldest publications of the kind in the country; then Scott's *Suburban Homes*, as well as the various works by Parsons and Miller, and, in fact, there were over thirty volumes. Among the latest were those of David Grayson, some of which I hope you have been reading, or if not, I encourage you to do so. After looking over this wealth of literature, I decided it would be impossible for me, out of all this, to condense much that would be of value in making an address of less than a half hour, and was reminded of the story which appeared in the *Outlook* on the 27th of last month, on Salesmanship, by Pete Crowther. He was being paid \$50.00 to give a lecture to a large company of salesmen, and felt that he would have to study up a good deal, and write out carefully just what he had to say, but he made out so miserably trying to deliver a set speech, that after talking a minute or two, he tore up his manuscript, and began speaking right from his heart, taking everyday conditions and conversing with his audience, and asking them to interrupt him with all the questions they wished to ask. This method resulted in a most entertaining and profitable evening, and I ask you to join with me in this same conversational way, and at any time ask all the questions that you like, and I will feel more at home in trying to answer these than in delivering any set speech.

In the days of our grandfathers the lawns had to be kept in order with the scythe, and in the days of their fathers with the sickle, so that there was little inducement for the farmer to try to keep a fine green sward surrounding his house. The introduction of the lawn mower has changed these conditions, and it is now unpardonable for the farmer altogether to neglect his yard or lawn.

I do not plead for expensive or extensive planting for most farm homes. Do not undertake to keep four or five times as large a lawn as can be kept in an attractive manner. It was an old saying that a farmer's love for his wife might be measured by the size of the wood pile he gave her, and we also might add to this the kind of a yard to the home which he furnishes her. If we men,

who are busy with outdoor affairs, and with the diversity of our work, which claims our attention, were to exchange places with our women, who have to perform the routine of daily duties with little variations or diversions, I believe we would claim the right to have a flower garden, where we could find that pleasure, recreation and uplift, which comes from the absorbing interest of watching the development of one's flower garden.

I do not plead for the planting of large specimens, or of expensive varieties of trees and plants. It would be a surprise to many to find how great a showing could be produced by the planting of a shrubbery border, using just the old favorite varieties of forsythia, lilac, mock orange, weigelas, snowball and hydrangeas, all of which could be bought at from thirty to fifty cents apiece, if only young plants are purchased; then supplement these by planting in the flower garden hardy perennials, embracing pinks, phlox, iris, peonies, hollyhocks, coreopsis, asters and chrysanthemums. From ten to twenty-five dollars, if judiciously expended, will procure a good-sized shrubbery bed, which will produce a succession of bloom from early spring to late autumn, and will not necessitate a great amount of care, although, of course, the ground will have to be kept in good condition.

Farmers, I ask, you, whether your silent partner (though she be not always silent) is not deserving of the pleasure, which this slight amount of expense and labor would incur in keeping the yard and flower garden in proper condition, in return for her untiring labor in trying to make your house a real home, as well as your farm a success, and do we not also want to make life on the farm so attractive as to keep our boys and girls in the country, and not have them go in droves to the city. How many fathers and mothers have had their hearts almost broken with grief, as sons and daughters have left the shelter of the home to try the unprotected life of the city, and often times a meager expense of fifty to a hundred dollars would have made things so attractive as to have kept them in the country growing crops, which means being producers of wealth, rather than going into the city with its unknown dangers. Let us cultivate the friendship of our children; let us try to be interested in the things they are interested in; that there be more unity of purpose in trying to make life worth while, with higher aims and higher ideals, realizing that these can be striven after and attained in the country quite as effectually as in the city. It is not hard work which drives our boys from the farms to the city, as much as it is lack of congenial environment. It used to be that the smart boys would be sent to town to make their living, and the duller ones kept at home on the farm. We now recognize that we want the bright boys as well as just the good, ordinary, plodding fellows, to bring the power of their intellect into scientific agriculture and horticulture, and the life which these fields offer in the way of remuneration, pleasure and independence, is far greater than that experienced by the average person who goes to the city. Do we not realize that the general appearance of the farm buildings and ground surrounding them are pretty true indexes of the financial condition of the owner? Do we expect to find thrift where buildings are delapi-

dated; where the house and its environments are cold and unattractive; no flowers, and a general appearance of shiftlessness? There are some farmers who say that they have such an uphill road to travel, that they can't afford to do anything towards fixing up their yards or lawn. That reminds me of the story of the man who met a stranger, and said to him, "Mister, how long is this hill—I have been travelling up hill for the last three hours, and don't find that I am any nearer the top now than I was when I started. When am I going to come to the top of it?" The man replied, "Why, Mister, you ain't going up hill—this is just a level road—the only matter with you is that you have lost the wheels off of your hind axle." It strikes me that there are a good many people in this world that are having an extremely hard time to ever reach the top, who have either lost their wheels off their hind axle, or have lost their proper view of life, or are suffering from dyspepsia.

My topic, I believe, is Ornamental Planting for the Farm Home, but while you are thinking of the questions you want to ask me regarding this phase, let me speak to you for a few moments regarding the adjunct to this ornamental planting, which is also frequently neglected by too many country people—I mention the flower garden—how many of us realize the great saving that can be made by raising vegetables which are necessary for the home consumption, and how much easier the work of the housewife to have a good supply of fresh vegetables when planning her routine of meals, and how much more healthy to live on these freshly grown products, rather than the canned goods which the poor city people have to live on to such a great degree. I believe we can't afford to neglect the kitchen garden to the extent we do, and I am sure if we men had the planning of the meals, we would insist on the product from a good garden, and would be convinced that it was a necessity from an economical standpoint, as well as that of health and pleasure. If there was a more general and judicious planting of shade trees around the farm buildings, it would add to their attractiveness and monetary value, and not only the standard shade trees, but why not plant fruit trees in some of the waste places—near the pig pen or around some of the corners that are now producing no profit.

The speaker devoted considerable time to answering questions put to him by various ones throughout the audience regarding the best variety of trees, flowers and shrubs to plant for various purposes, and emphasized the following facts:

First: Planting of fast growing shade trees such as catalpa, soft maple, Carolina poplar, and willow, produce a quick effect, but not a lasting one. Slow growing trees, such as oaks, hard maples, last for generations.

Second: Certain shrubs such as viburnum, bush honeysuckle, symphoricarpu, mountain laurel, rhododendrons, azaleas, and privets thrive in partial shade as well as in the more open spaces.

Third: A judicious planting of the old standard varieties of shrubs and perennials massed in border planting are most effective and moderate in cost.

Discussion.

Prof. Surface.—What plant is best for a low hedge under large trees?

Mr. Moon.—That is hard to manage. No plant will continue to do well under large trees on account of the lack of moisture.

Question.—Do trees dug out of the woods transplant safely and easily?

Mr. Moon.—No; on account of the character of the root systems they are harder to move than nursery grown trees which have been frequently transplanted in the nursery.

Question.—Would you advise the planting of the quicker growing shade trees?

Mr. Moon.—Yes; under some circumstances when it is desirable to get very quick shade. Even Carolina poplar can be used between slow growing trees to be taken out when the more desirable slow growers have attained some size.

Question.—How about Japanese maple?

Mr. Moon.—Good. Do not forget the Japanese maples, and do not plant the ones with bright colored foliage in shady places.

BETTER FRUITS AT LESS COST.

PROF. H. A. SURFACE, *Harrisburg.*

The two points involved in this topic are: First, the production of fruits of higher quality; and second, the reduction of the cost of production.

Before proceeding far upon a discussion of quality we should establish a definite basis by defining this much-abused word. Perhaps we should go farther back and explain what quality is not. Therefore, we are prepared to say that quality does not mean huge size. Compare a Jonathan apple with a Wolf River, for example. Neither does this word mean the production of giants within any one variety. Let it be remembered that the scoring rules of The American Pomological Society properly provide for the scoring down of specimens of any variety if they are over size or above a fair standard.

Quality is not red color. Compare Ben Davis and Grimes. Neither is it fine appearance alone. Compare a western boxed apple of any variety with a roughly-handled eastern grown Northern Spy, Baldwin, McIntosh, Tompkins, King, Grimes, Jonathan, or Stayman Winesap. Neither is quality produced by boxing what

should be put into a barrel. Neither is it to be found in naturally low grade or mediocre varieties.

Quality in fruits is an epitome of those desirable features embraced in pleasing flavor; fair, uniform size for a certain variety; good, uniform color for the variety; freedom from injury by insects, or by fungous diseases, and the absence of artificial injury, such as bruises.

Now comes the very important question. "Will one-tenth of our fruits measure up to this standard?" and the more important reply, that the average of the crop for America does not. Why not? Because there are more persons growing fruit trees who absolutely neglect them, producing nothing but culls and seconds, than there are who attempt to care for them and produce a first grade product. We have shown in the demonstration orchards of the Bureau of Zoology of the Pennsylvania Department of Agriculture, trees bearing apples ninety-eight per cent. free from worms, which, but two years ago produced fruit ninety-five per cent. wormy. The difference is due chiefly to negligence on the one hand, and care on the other.

With all orchardists the greatest problems involve the questions of How to Improve Quality, and How to Reduce Cost. To such men we venture to speak from personal experience in our own orchards which are, we believe, the largest in the Keystone State, and which produced, this year, carloads of fancy fruits that sold at record prices.

I. To Produce Fruits of Better Quality.

1. Select "fruit soil." This must be deep, loose, and originally fertile. This produces good growth and large fruits. The "abandoned farm" proposition for successful fruit growing is generally a mistake. Starved trees usually produce poor crops of small size fruit.

2. Select land with elevation for air drainage. Dead or stagnating air is as sure to foster diseases of trees and fruits as of human beings or live stock. Low lands cannot produce fruits of highest color, free from fungous injury. Actual elevation above sea level is not nearly as important as relative elevation, above immediate surroundings.

3. Plant the orchard in soil with good water drainage. A tree cannot thrive with wet feet any more than can a man. Wet soil means poor growth, diseased trees, and small, pale, insipid fruit. If your orchard has been planted in wet soil, nothing will pay better in the production of fruit of quality and quantity, than to drain it well.

4. Plant good varieties, and top-work the older trees of poor varieties if they are vigorous enough. In an orchard there will be no figs from thistles, and no Rome Beauty nor Stayman Winesap from Smith Cider or Ben Davis.

5. In any region plant only those varieties that do best there. It would be a mistake to reduce the quality of the ensuing product by planting the Spy in the Albemarle region, or the Rome Beauty

in the Snow region, however excellent each of these may be when grown "at home."

6. Plant only healthy trees from reliable nurserymen, but pay no attention to the "old fogey" notion that hardy trees are to be obtained only from the North or young-bearing trees only from the South.

7. Plant at such distance between trees as to permit abundant growth without crowding, and also provide for the spreading of low broad tops, without that crowding and shading which must result in light-colored fungous-specked fruits.

8. Help to obtain color by so pruning as to grow low, open spreading tops. Top back old tall trees to spreading branches. Get sunshine and air to each fruit, if possible, to give color and flavor.

9. Also obtain *color* by (a) growing in suitable soil, (b) at some elevation; (c) with potash and phosphoric acid fertilizers; (d) reducing the nitrogen so as to avoid too rank growth where greater color is wanted; (e) not cultivating too late in the season, and (f) not pushing too much leafy growth by severe dormant pruning; but (g) remove superfluous small growth by judicious midsummer pruning.

10. Strive for *uniformity of color* by adopting a definite, uniform system of pruning that will keep the tops open and spreading; avoid dense masses of foliage or such arrangement of branches as will close and become dense by weight of fruit; adopt a system of uniform feeding.

11. Where growth is liable to be too rank, and thus reduce color, as is usual on low or damp ground; or, where dormant pruning has been too severe, manuring too heavy, or cultivation too long continued; better color for any one season may be obtained by summer pruning.

12. Obtain *size* by those methods that give strong leaf and twig growth, and by thinning; but, in so doing avoid producing that extreme rankness of growth which detracts from color of fruit. Do this by (a) securing a fertile soil; (b) by retaining moisture by mulching or by cultivation and cover crops; (c) by replacing removed fertility and organic matter by commercial fertilizers, manure and cover crops, especially the legumes; (d) by stimulating growth when needed by dormant pruning; by thinning early and vigorously, and (f) by keeping the leaves healthy through spraying with proper insecticides and fungicides. Healthy leaves mean large, healthy, late, fruit.

13. Obtain *uniformity of size* by a uniform system of pruning, and especially by systematic thinning, feeding, cultivating, mulching, manuring, etc.

14. Both *increased size and color* can be obtained by making several pickings, taking each time only those that are well developed and colored, leaving the others for future development in size and color.

15. Avoid *blemishes* from diseases by spraying with fungicides, according to the teachings of our plant pathologists, and by planting varieties on ground suited to each respectively. For example: Champion peach, on low ground or where there is no air drainage,

is almost sure to have ripe rot, and Salway in such a location is very liable to have scab and crack. Also spray with strong lime-sulphur solution once each dormant season, better immediately before the leaves appear; and with Bordeaux Mixture or self-boiled lime-sulphur just before the blossoms open; and spray again with the same, at proper intervals, two or three times after the blossoms fall.

16. Avoid *injury from insects* by knowing those that are most liable to appear, and watching for them or their work. For their suppression, follow the teachings of the most modern entomologists. In all cases, for economy of production, practice the methods of prevention rather than of remedy.

Spray for insects once when dormant, with strong lime-sulphur; for the apple aphis make this application immediately after leaf buds burst; also use an arsenite with the fungicide for each of the subsequent sprayings.

17. Modern horticulture so emphatically demands that the operation of *thinning* be practiced that especial attention must be directed to this process as a means of (1) increasing the size of fruit; (2) obtaining uniformity of size; (3) eliminating defective fruits; (4) equalizing the distribution of the load, and in consequence opening the top uniformly without breaking the branches; (5) giving uniformity of color; and (6) above all else, preventing exhaustive production this year, thus making it possible to set fruit buds for next year's crop, resulting in annual rather than biennial crops.

18. *Fallen or bruised fruits* are prevented by growing them on very low headed trees, which properly brace themselves with their branches; also by picking before they are dead ripe. Injury from falling is avoided by a good mulch under the trees.

19. The *bruising of fruit by harvesting* must be avoided by careful handling from start to finish. Any person who cannot handle fancy fruit more carefully than eggs, should grow only Ben Davis apples and Kieffer pears.

The grain bag over the shoulder is still too often used for picking. Pick in baskets or picking buckets. Do not press, bruise or rub fruits. Handle just as little as possible, and keep the "bloom" on apples and plums particularly, as this is one of the elements in the quality we wish to produce.

20. Finally, to obtain the highest degree in quality let the fruit mature on the trees. Fruits picked green do not develop with their best flavor or color. This is why, in every region, fancy "home grown fruits" are preferred by consumers to those grown elsewhere and picked unripe to stand shipping.

II. To Reduce the Cost of Production.

The second feature of the subject is more difficult to treat than the first part, chiefly because there is not enough established horticultural orthodoxy or theory in this regard to prove that our own experiences are in conformity with those of others. Therefore we shall speak of our own satisfactory practical methods in reducing the cost of production, letting others express their views in the gen-

eral discussion. Let us kindly bear in mind the fact that in many regards the two features of our subject are only relatively compatible. We have been obliged to harmonize them as far as possible in our practical orchard operations, and in this treatment shall give the same numbers to related topics, as far as possible.

1. Good fruit soil is generally cheaper than rich or more level farm land that may be less desirable for fruit production. Proper fruit soil produces trees of good size, and fruits of best quality and in large quantity; thus reducing the relative cost of production. In this connection it should be mentioned that proximity to market or shipping station, to reduce the cost of hauling, is an essential factor.

2. Where there is good air drainage or local elevation, spring frosts do not so often injure blossoms or tender buds or fruits, and thus there are more frequent and larger crops, resulting in lower relative cost reduction.

3. Well drained soil means healthy, vigorous trees. Wet soil means poor trees, and, worst of all, apple tree diseases, such as root rot, collar blight, and others. Instead of a good income from a fine crop on healthy trees, money must go to replace dead ones, or there will be that very serious loss that comes from leaving vacant places in the orchard. Wet orchards should be well drained; but, the economy of dynamiting is yet to be proven in general, for we know where it has been very unsatisfactory.

4. Good varieties are quoted constantly in price above poor kinds. Compare to-day's quotations on Stayman Winesap, Rome Beauty or Baldwin, with those of Ben Davis, Smith Cider or Shockley.

5. Adapted varieties give finer fruits and larger yields than those not adapted to the region, and, of course, as these sell more easily and for higher prices, they help to reduce the relative cost. A very important economic consideration is that it pays all commercial growers of a community to put their efforts into growing perfectly only those varieties (often but one or two) that are decidedly best there.

6. Healthy young trees from reliable nurserymen mean ready, vigorous growth without stunting by transplanting, and large, early crops, if otherwise properly handled. Trees not true to variety ordered may mean years of loss.

7. Plant at sufficient distance, and on the square system. The writer now plants all permanent apple trees forty feet apart, and all others at twenty. This permits profits from inter-cropping, cultivating each direction, and the development of large trees with full crops.

8. Low open-headed tops cheapen the cost of production by reducing the work of pruning, spraying, thinning and picking; and prevent heavy loss by wind falls, as well as mulch their own soil.

9. Reduce the necessity for expensive commercial fertilizers by growing legume cover crops. The writer uses chiefly crimson clover and winter vetch and rye. We sometimes sow crimson clover with buckwheat and harvest the latter. One orchard gave eighty-four bushels of buckwheat this year. In another the crimson clover was sown with cow horn turnips, and we now have a

good stand of the former, with over \$100.00 worth of excellent turnips, without detriment to the young trees.

10. Nitrogen, the expensive element in commercial fertilizers, is not needed where the legumes are grown in an orchard. We need buy only muriate of potash and acid phosphate, and need but little of these where orchards are comparatively young and occasionally cultivated.

11. Pruning can be done at any time of the year, if not too severe; and necessary severe pruning can be done at any time during the dormant season. Thus it is a "filler" job that can be done with economy when more important work is not pressing.

12. For cover crops we grow our own seed between the cultivated tree rows in the young orchards, and in any orchard that will not produce fruit that year.

13. A uniform stand of symmetrical trees helps to maintain the income by insuring fruit where otherwise there would be vacant spaces.

14. Plant varieties to ripen in succession, and thus keep the pickers engaged.

15. We make all our own spray materials, saving time and expense by preparing stock solutions during bad weather.

16. We spray as many times as are necessary, but no more. This is four (or, at most, five) times in the year for pomes, and three times for drupes.

17. Owing to our low-headed trees the thinning is done easily and quickly, mostly from the ground, and chiefly by women and girls; thus greatly reducing the cost.

18. There is much less financial loss from fallen fruits from trees with very low spreading tops, because less droppings and less bruising.

19. Low trees permit economy in time and methods of picking.

20. Co-operative or wholesale buying of supplies and selling produce helps much in reducing the cost.

21. Our friends may expect us to recommend the elimination of spraying for the scale by the introduction of scale parasites (of which much recently has been printed); but we can not yet be sure that in all orchards they will do their work as thoroughly as they have in our own and in hundreds of others we have carefully inspected in Pennsylvania. It is surely worthy of careful consideration. We have discovered and published regarding certain entomological conditions, and have been criticized by a few who have been too narrow to understand or believe them, and of course by certain agents of scale-spraying materials. We have seen enough to give firm faith in the adequate reduction of the San Jose scale by minute internal hymenopterous parasites. If any unprejudiced person will come to Harrisburg, Penna., and go with me to see a score or more of orchards that have been cleaned of San Jose scale by the parasites, and then not agree that these natural agencies have been efficient in suppressing the scale I am willing to pay the expenses of the trip. Hence, our recommendation to "Reduce the cost of production by the application of modern methods."

Discussion.

Question.—Do you not have more trouble with fire-blight when the trees make too much growth?

Prof. Surface.—Yes; it is so.

Question.—Can you grow crimson clover satisfactorily without inoculation?

Prof. Surface.—Sometimes you can, but generally you can do much better by inoculating.

Prof. Heiges.—I have grown all the common legumes successfully without inoculation, but I use lots of lime. These crops will not grow in an acid soil.

Question.—Do you paint the stubs after pruning?

Prof. Surface.—Yes, if the stubs are more than one inch across.

STATE FRUIT GROWERS SEE THE SAN JOSE SCALE PARASITES.

By PROF. H. A. SURFACE, *Harrisburg*.

Prof. H. A. Surface, State Zoologist, presented a scientific paper on the parasites that he has found so efficient in destroying the San Jose scale in the orchards in several counties in the southeastern part of Pennsylvania. He showed both slides and specimens of the different species of minute wasp-like or hymenopterous parasites that have been reared in his office from the San Jose scale during the past three years.

These minute specimens include just one dozen different species, two of which are probably new to science, and ten of which have been identified as named species, some of which are common, and others very rare. As there are no common names for the different species or kinds of these parasites they must be known by their scientific names, which are proven to be as follows:

Aphelinus fuscipennis, bred from oyster shell and San Jose scale.

Prospaltella perniciosi, bred from San Jose scale and oyster shell scale.

Prospaltella perniciosi, male and female, bred from oyster shell and San Jose scale.

Encyrtine (sp. nov.), with eggs, bred from San Jose scale.

Encyrtine (sp.-?), bred from Rose and San Jose scale.

Anagrus spiritus, bred from San Jose scale.

Signiphora nigra, bred from San Jose scale.

Perissopteris mexicanus, bred from San Jose scale and oyster-shell scale.

Aspidiophagus citrinus, bred from Rose scale.

Arrhenophagus chionaspidis, bred from Rose scale.

Ablerus clisiocampæ, bred from San Jose scale.

Unnamed species, with eggs, bred from San Jose and oyster shell scale.

Dr. L. O. Howard, U. S. Entomologist, Washington, D. C., has co-operated with Prof. Surface in identifying material.

The latter person has discovered and proven beyond doubt that these parasites have been thoroughly efficient in destroying the scale. Since he has called attention to this fact other persons in the formerly scale-infested districts are acknowledging the same, although some agents for spraying materials and apparatus deny it.

Since the announcement of discovery of these facts by Professor Surface at the summer meeting of the State Horticultural Association, at Gettysburg, his office has been besieged by hundreds of applications for the parasites to be placed in orchards. He has sent the desired material in all cases, with instructions to use the spray pump and apply the boiled lime-sulphur solution during the dormant season on scale-infested trees, to hold the scale in check until the parasites become well started.

The fact that such parasites are enemies of the scale and can be successfully disseminated by mail has already been proven, as in a case brought out at a public demonstration near Mifflin, when a lady who owns an orchard brought cuttings from her different apple trees to Mr. James Bergy, who was giving a demonstration under the directions of the Bureau of Zoology. She asked him to state if any of the twigs contained parasitized scales. After careful examination he found only two whereon the scales were being killed by the parasites. She then replied that those two twigs were from the tree in which she had placed parasitized material received from Professor Surface's office during the summer. These were apparently the only ones from her orchard that had yet been reached by the parasites, but it is believed that they will continue to spread.

HOW I WOULD START AN APPLE ORCHARD.

MR. HOWARD A. CHASE, *Mount Pocono, Pa.*

The age of a tree to be planted is important. I prefer a tree two years from the bud or a three year graft, five-eighth to seven-eighth of an inch in diameter, provided, I can secure a tree that has been headed comparatively low, from thirty or thirty-two inches and the limbs are well distributed. I would prefer to have the lower limbs not over eighteen inches from the ground. With a tree of this character I would remove all but three or four limbs, and unless there may be an individual limb much longer than any of the others I would not cut or head the limbs back when planting. The roots I would trim, cutting from the underside and cutting them

back so that the individual roots would aid in bracing the tree after it is planted.

Some planters prefer a tree one year from bud, or two years from graft. Were I putting out a tree of this age I think I would let it grow one year without pruning, and then I would head it down to within thirty or thirty-two inches of the ground. This would force a good growth the second season, and from three to five limbs could be allowed to grow to form the future head of the tree.

Preparation of the Ground.

The ideal preparation is to have ground well cultivated and in as good condition as one would prepare it for an ordinary farm crop. Where this is done it is not essential that a large hole should be dug, but one of sufficient size to admit the roots without crowding them; then as the tree is planted, the fine dirt should be packed in carefully about the roots; sometimes the shaking of the tree will accomplish this, in other instances it is essential to use a small stick; then as the hole is filled, pack the dirt down firmly so that no air can reach the roots. Last but not least, cover the surface with either loose dirt or some coarse material as a mulch. On ground of this character I would intercrop with sugar corn or peas or some kindred crop. Do not plant near the trees, but leave sufficient space so that they can be thoroughly cultivated even after the last cultivation for the intercrop. In other words, keep the ground about the trees mellow, never allowing it to be baked. If sugar corn is planted, with the last cultivation of the corn I would sow Canadian field peas, these to form a cover crop. Then with the last cultivation of the trees I would use field peas or buckwheat. Under ordinary conditions the last cultivation had best not be much later than early in August. Before planting I would paint the trees for a distance of eight or ten inches above the roots with white lead and linseed oil as a guard against borers.

There is many a piece of rough ground adapted to apple growing that cannot advantageously be cultivated. With ground of this character I would dig the holes in the fall, making them at least two feet in diameter and twelve inches deep, being careful to throw the top soil in a pile by itself. Dynamite can be used to advantage in this character of ground, provided it is so used as to break up the soil instead of simply blowing out a hole. Then I would fill these holes with coarse stable manure mixed with some form of potash if practicable. German potash can be used in this connection with good results. In the spring fork out the coarse litter, using the same for mulch after the tree is planted. Then the ensuing fall bank the dirt up eight or ten inches about the body of the tree, and in order to do this enlarge the surface of the original hole. As soon as this is done, fill the ditch, that will be formed in making the mound, with stable manure; in early spring the dirt should be leveled down and kept loose during the season. A good tool for this purpose is a potato hook, such as is used when digging potatoes by hand. Each fall mulch and manure such trees, extending the space about the tree gradually from year to year. With annual mulching and manuring

good results can be secured without plowing or otherwise attempting to cultivate the ground. Be careful not to have the manure come in contact with the body of the tree.

I would do very little pruning until the tree commences to bear. If a limb is pushing out more rapidly than others I would head it back in mid-summer so as to check its growth. If a limb is crossing another it can be removed, but delay any general pruning until the tree goes into fruiting. Heavy annual pruning in thinning out the limbs or heading them back while the tree is young will cause it to produce wood instead of developing fruit buds. Then when it comes to the ultimate pruning, no two varieties, and for that matter no two trees should receive the same treatment. I believe in low headed and open headed trees, so that as they attain full bearing size and are loaded with fruit the ends of the limbs in many cases will rest upon the ground.

Distances: Free growing varieties like Baldwin, Stark and Stayman, I would plant from thirty-eight to forty feet apart. While varieties like Oldenburgh, Wealthy and Boiken, I would put twenty-eight to thirty feet apart. I would plant in squares and were I to use fillers in the thirty-eight to forty feet varieties, I would plant apples only in the center of the square, using peach trees for the remainder of the fillers.

In theory it is all right to use the smaller growing and early bearing varieties like Oldenburgh and Boiken as fillers for the entire block, but there is danger that they will not be removed when they begin to crowd the permanent trees. If planting fillers in the center of the square, aim to put out varieties that will bloom at the same time as the others. I think that sufficient attention has not been given to the importance of cross pollination, but I am not prepared to say what varieties of apples should be planted in conjunction with others to give the best results.

In planting an orchard of Bartlett pears one row of Anjou should be planted to every five or six rows of Bartletts. Where this is done the result upon the Bartletts is very marked, not only as to the fruitfulness of Bartletts, but the size of the fruit.

Keifer is another pear that needs assistance in pollination, but I am not prepared to say what is the most desirable variety to plant in conjunction with Keifer for this purpose.

In planting standard pears I would give them about the same treatment as apples, excepting I would fight shy of stable manure, though the same might be applied as a top dressing in the fall. Bartlett and Keifer have a tendency to develop fire blight if fertilized too highly. Seckel, on the other hand, is a coarse feeder; lime, potash and buckwheat, the latter to be sowed as a cover crop, can be recommended in pear culture.

Discussion.

P. S. Fenstermacher.—If we could get trees from the nursery headed just right we could make our plans and do accurate pruning but so many of the trees we buy have limbs broken and tops generally out of shape that I prefer to plant one year whips and grow my own top in the orchard.

Mr. Chase.—If a tree is handled as it should be in digging and packing, it should come in good shape.

Jas. M. Moon.—I believe I must take exceptions to the cutting back of side branches. If the tree is growing in the shape you want it, why not let the limbs grow and make it a good top as soon as possible so as to bear a crop without waiting too long.

Mr. Fenstermacher.—You certainly must do some cutting back to keep your trees from growing all over the place.

S. S. Shank.—Why do the New Jersey trees that are not headed back, simply allowed to grow, begin bearing so young and bear so heavily, while some of our own that are headed back and pruned hard are spending all their strength in growing wood.

Mr. Chase.—That is probably due to the difference in soil and then in this matter of pruning, we must always consider the variety with which we are working.

A. D. Strode.—Do trees with many fibre roots grow better than those without?

Mr. Chase.—No, I do not think they do for the fibre roots dry up any way, but whatever you plant insist on the nurseryman giving you the roots that belong to the tree.

SOME ORCHARD DISEASES AND THEIR TREATMENT.

BY PROF. C. R. ORTON, *Plant Pathologist, State College, Pa.*

The diseases of fruit and fruit trees are almost too numerous to mention and so the title assigned for this address implies that only a part of them will be discussed. For the purpose of bringing before the members of this Association some of the practical points regarding orchard diseases, their control and treatment, which may not be generally understood, I have thought it best to discuss only a few of the more destructive diseases at this time.

It is certainly true that there are now more plant diseases in Pennsylvania than there were several years ago. To some this is a difficult condition to account for, but the explanation is obvious to one who has made an extensive study of plant diseases and their geographical distributions.

There are two important factors which have greatly assisted in the spread and introduction of plant diseases. These are (1) The removal of natural barriers between localities and farms, such as forests, uncultivated land, etc., and (2) The ease with which nursery stock, seed and fruit are shipped between countries, states and localities. The great importance of the international exchange of horticultural plants and the spread of diseases and insect pests through this medium has, during the past decade or longer, been forcibly im-

pressed upon our national government and resulted in the passage by Congress of the Simmons Bill, which became the Plant Quarantine Act, August 20, 1912. The full text of this bill has been printed in the form of Circular 44, Office of the Secretary, U. S. Department of Agriculture.

This law provides for the regulation of the importation and inspection of "all field-grown florist stock, trees, shrubs, cuttings, grafts, scions, buds, fruit pits, and other seeds of fruit and ornamental trees or shrubs, and other plants and plant products for propagation," with certain exceptions therein noted. Importations are regulated by the use of permits and foreign certificates issued by the Department of Agriculture. This regulation may be extended to cover interstate trade under specified circumstances.

For the enforcement of this act the Secretary of Agriculture appoints a Federal Horticultural Board with headquarters in Washington. This board is assisted by the plant pathologists of the several states in the capacity of collaborators.

This movement is a great advance in the prevention of the importation and the control of plant diseases and insect pests. If this law had existed even ten years ago such diseases as bitter-rot, blotch and crown gall of apples, chestnut blight, white pine blister rust, wart and powdery scab of potatoes, and other diseases, as well as such insect pests as the gypsy and brown-tail moth and certain scale insects might have been restricted to small areas and possibly stamped out entirely. I do not mean to imply that the millennium of phytopathology is at hand but I do think that we are making rapid progress in plant disease prevention and that the sooner you practical horticulturists realize this and put your "shoulders to the wheel" the sooner you will derive the benefits of such efforts.

There is no time better than the present to correct an error of understanding, no matter in what line, and right here I wish to bring out the differences between the application of the terms *prevention*, *control*, and *treatment*, in plant pathology. There is much truth in the ancient "ounce of prevention" theory and it especially applies here. *Prevention* implies precaution and forethought and in just this sense it should be applied by us as a precaution against the introduction and spread of disease. *Control* becomes the important factor after the barriers of prevention have been broken down, or, as is more usually the case after diseases have been introduced upon our crops because no special attempt was made to prevent their introduction. *Treatment* is a term more specific than control and is a variable which changes with the nature, cause and environmental factors of the special disease at hand. There has been and still is much confusion and lack of uniformity in the use of these terms and my idea in explaining this is to correct such misapplications as you are likely to come across.

The work of the Federal Horticultural Board is to *prevent* the further importation of crop diseases and to *control* some of those recently imported which are likely to be established in the United States. *Prevention* and *control* are also duties of the plant pathologist in so far as he may be able to use his influence and training for the direction of certain methods which may bring about the de-

sired effect. Co-operation on the part of the practical fruit growers is very essential for bringing about control measures satisfactorily. *Treatment* is a special problem to be worked out by careful investigations of the particular disease at hand. It may depend largely upon the crop, nature of the disease, condition of the soil, method of fertilization, and possibly other factors. It should be added here that whatever I have said thus far applies to insect pests as well as to bacterial and fungous diseases.

I have elaborated perhaps too fully upon some of the phases of plant pathology but if so it is only for the purpose of impressing upon the practical horticulturist the value and necessity of such steps as I have outlined.

Fire Blight.

Fire Blight is one of the most serious diseases of the apple, pear, and quince, which we have in Pennsylvania. It also attacks the plum and apricot among our cultivated fruits. It is a disease native to North America, probably upon such pomaceous hosts as the June-berry, hawthorne, and wild crab. From these hosts it spread to the cultivated hosts when they were introduced into America. It is usually true that plants removed from their natural habitat become more susceptible to disease. This was certainly true of the apple, pear, quince, with regard to fire blight. The disease has been unknown in Europe, the native home of these hosts, until quite recently when it has been found in Italy. It was almost surely carried to that country from North America. What effect this North American parasite may have upon pomaceous hosts growing in Europe is as yet unknown, but judging from analogy the most severe attacks may be expected for the reason that the European fruit trees have had no chance to develop immunity to this disease by years of association, as have our native hosts in North America, such as the hawthorne, wild crabs and mountain ash. Such an experience has been demonstrated in the United States several times, as for instance, when the chestnut blight fungus was imported from China into the United States, and the gypsy and brown-tailed moths were imported. All of these pests were much less dangerous in their native country.

How long it takes a plant to develop this immunity is another question but we know that it is much longer for some plants than for others. Fire blight has been prevalent in the United States for about a hundred and thirty years, and the virulence of its attack upon its cultivated hosts does not seem to be diminishing very rapidly. We may say, however, that during this time some varieties of apples and pears have been developed which appear to possess resistant qualities. It is known though that some of these varieties which appear resistant in one locality are more susceptible when grow under other conditions. What appears then as resistance is seen to be often a local question which can be most readily solved by the practical grower for his own conditions.

The early nursery men and fruit growers of our country believed fire blight to be due to scorching by the sun. Later, freezing,

electricity and fungi were blamed for its appearance. It was not until 1879 that the real cause of this blight was made known through the epochal discovery by Burrill that it was due to bacteria. Although his work was ridiculed by many scientists for some time, especially Europeans, it was definitely proved later by Arthur and others by pure culture inoculations that a specific bacillus known botanically as *Bacillus amylovorus*, was the true cause of fire blight.

Burrill's discovery opened up the whole field of bacterial phytopathology, a branch of our science to which Dr. E. F. Smith, of the United States Department of Agriculture, has long been devoted and which has resulted in his discovery that crown gall and hairy root of fruit trees are also due to a specific bacterial organism which has been named *Bacterium tumefaciens*. Thus two of our most serious fruit tree diseases have been found to be due to the simplest forms of known plants, bacteria.

The losses from fire blight run into millions of dollars in certain years in this country. Last year was no exception, and it is safe to say, I think that Pennsylvania lost many thousands of dollars from this one disease last season alone. Reports show that it was very prevalent and destructive throughout the State and its effect will last for several years to come unless prompt measures are taken for its treatment.

There are for convenience in discussion, five kinds of fire blight, (1) blossom blight, (2) twig blight, (3) fruit blight, (4) limb or body blight, properly called canker blight, (5) collar blight, all caused by the same organism. According to their action on the host the first three may be called active blight and the last two passive or resting blight, although the passive form may assume active progress under favorable conditions.

Blossom Blight.

Blossom blight is the first in the season to appear and often remains unnoticed because of the transitory nature of the blossom. This form of the blight is actively disseminated from canker blight to healthy blossoms by various nectar collecting insects such as bees, wasps and flies. These insects carry the bacteria on their body and appendages from the sticky ooze, which is made up of bacteria exuded from limb or body cankers during the rapid ascent of sap in the spring, to the blossoms which they visit in their search for nectar. The result is the blighting of all such infected blossoms. There is no doubt but what frequently such blighting is ascribed erroneously to the action of unfavorable weather conditions or frosts.

Twig Blight.

This blight usually appears after the leaves are out and the fruit well set, although it may appear at intervals through the summer on succulent shoots. It is characterized by a browning of the leaves and blackening of the young bark and sap wood giving the tree the appearance of being burned at the tips of branches. Frequently this blighting is so severe as to give the trees the appearance of being entirely burned throughout the top. See Plate 5, Fig. 1.



FIG. 1. Apple tree seriously affected with twig-blight. Note the wilted leaves on the outermost twigs.

PLATE 5.



FIG. 2. Apple tree showing a typical case of collar-blight which has progressed rapidly up the trunk.

PLATE 5.

It is not unusual for trees, especially nursery stock, in this condition to be killed outright. This form of blight is also spread by insects but by a different class than those spreading blossom blight. In this case sucking or biting insects such as aphids, the tarnished plant bug, etc., are very instrumental in carrying the bacteria from twig to twig. Care must also be taken when pruning during spring and early summer not to spread the blight by the careless use of tools.

Fruit Blight.

This form of blight usually accompanies twig blight. The fruits show a browned or darkened area on the skin of varying extent according to the time which has elapsed after infection. As a rule the fruits are covered with small beads of the bacterial exudate which make them very sticky to the touch. Insects are here also the primary cause of the spread of this form of fire blight. Care must be taken in removing twig blight not to overlook fruit blight.

When blossom, twig or fruit blight appear the only method of treatment is to prune off all such parts at once, taking care to prune well below the darkened area of bark. It is best to cut at least six inches below the lowest visible signs of the blight when it is on wood of the current season's growth. It has been proved that the bacteria penetrate much more rapidly and farther than external appearances indicate. On older wood the organism works more slowly and so two or three inches taken off below the browned area on such wood is probably sufficient.

The equipment necessary for this work consists of pruning shears, a bottle of corrosive sublimate and a sponge for applying the disinfectant to the shears. It is not thought essential to collect the smaller twigs after their removal, for experiments indicate that the organism cannot live on dead wood. For disinfecting the pruning shears and the cut surface of large branches left exposed, corrosive sublimate is the cheapest and most satisfactory. It should be used at the strength of 1:1000 parts of water, and is easily prepared by dropping one mercuric chloride tablet in a pint of water. These tablets can be obtained at the drug store as a rule, and if in doubt as to their strength ask the druggist how to make up the 1:1000 solution. Care should be taken to keep these tablets in a safe place and labeled *poison*; also any of the solution left over should be treated in this same careful manner as it is very poisonous if taken internally. Formaldehyde solution of one per cent. strength may be used, but is offensive to the nostrils and hard upon the hands.

It is no easy matter to cut out a serious infection of blossom or twig blight in an orchard of large trees where ladders must be used. In order to eliminate and control the blight to a minimum careful inspection *must* be resorted to at least every week from blooming time until the fruits are one-third to one-half grown, and any blighted twigs, however small, removed at once. Only by such careful inspection and removal, and the co-operation of all fruit growers in the locality can blight be controlled.

The origin of blossom and twig blight in an orchard brings us to the next point to be discussed, namely, canker blight.

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PLATE 5.

Canker Blight.

When an infected twig is not removed from a limb, eventually the bacteria work into the larger limb and there form a canker usually more or less orbicular in outline, or it may even work down the limb into the trunk of the tree, forming a long canker on its trail. These cankers are usually very typical, forming a sunken area the margins of which are more or less irregular and usually cracked away from the sound bark. See Plate 6, Figs. 1 and 4. These cankers may persist season after season without much extension and form deep cankers with well developed callus growth at their margin. It is in these cankers that we have what is called the *hold-over or resting blight*. Each spring as the sap becomes active and growth starts, the bacteria which remain alive through the winter in the living wood at the margin of the cankers, start growth and usually burst out through the broken bark, thus forming the sticky ooze to which insects are attracted. From these cankers the insects visit the blossoms and twigs and spread the infection rapidly. It becomes most essential then, in order to control the spread of fire blight to *remove these blight cankers*. This can be accomplished best by a thorough inspection in the early spring for such cankers or sunken areas in the bark and such places cut out immediately and the wound disinfected with corrosive sublimate. After the wound has dried paint it over with pure white lead and oil, asphaltum or grafting wax, to protect it from fungous invasion and to facilitate the formation of callus growth. When cutting out the cankers use a chisel or any sharp tool handy. Sterilize it after making each cut and be sure to cut back well beyond any browned bark or discolored sap wood; two inches beyond the cankered area is none too far for large cankers. This phase of control is extremely important and if all of the cankered areas could be removed the blight would be effectively controlled, providing it was not brought into an orchard from a neighbor's infected trees. A point to be added here is the danger of allowing old scrubs of apple trees to grow in fence rows about the farm. They may be the chief source of infection to your valuable orchard. Blow them out with dynamite so as to remove the roots to prevent the formation of suckers which may propagate the blight.

The predisposing factors to twig blight are, (1) weather conditions, (2) the rapid growth of new shoots, and (3) the presence of insects as carriers or agents in dissemination. Weather conditions are important as it is known that blight is much more destructive just after an abundant rainfall followed by warm, cloudy weather. At this time the twigs are very succulent and in their most susceptible conditions.

Trees which, on account of fertilization or heavy feeding, have produced abnormal growth of twigs and suckers, are especially liable to be blighted. Numerous experiments have shown that nitrogenous applications to orchard soils tend to produce a rapid growth most favorable to the attack of the blight organism. The presence of sucking insects and bark borers have more to do with the spread of blight than any other factor probably. It is likely that if aphids,

the tarnished plant bug and the bark borers were controlled, twig blight would be decreased to a minimum. There is considerable evidence to show that the presence or absence of insects is of more importance than varietal resistance to fire blight in blight control, and that apparent resistance may be due to the immunity of certain varieties of trees from insect attack.

Collar Blight.

Collar blight or "collar rot" as it is locally known, has undoubtedly been prevalent in Pennsylvania for many years, although the real cause has only recently been known. The first published account of its occurrence in the State was that by Dr. J. P. Stewart in the *Rural New Yorker* of May 1907. It has been especially severe in Adams, Franklin and other counties in the southern border. A recent survey of the State shows that it occurs in over twenty counties. It is also considered to be one of the most severe diseases in Maryland, Virginia, West Virginia, New York, and Ohio, and is doubtless more or less severe in practically all apple growing regions of the country.

The disease is characterized the first year by a general unhealthy condition of one or more limbs of the tree during the growing season. The foliage appears light green or yellow, and the fruit is usually much undersized. The leaves and fruit may both drop in late summer long before the normal time. If the collars of such trees are examined during this period sunken areas in the bark are found varying in size according to the time of infection, and the condition of the tree at that time. The bark in this area becomes soft and easily may fall away when disturbed. It is dark in color, usually rather wet and often has a sour odor. The sap wood under this bark is browned or blackened. The second season the disease progresses rapidly as a rule and may girdle the collar, or it may, under certain conditions, work up the trunk into the larger branches. See Plate 5, Fig. 2. It may take several seasons to kill the tree in some instances, but the results are certain in any event.

It is noteworthy that only trees between the ages of seven and twenty years are susceptible to this form of blight. We see, then, that it attacks trees which are in their prime, and of course when ordinarily most healthy. Trees in well cultivated and cared for orchards appear to suffer most apparently because of the greater succulence of their tissues. Almost any variety appears likely to be attacked but Grimes Golden and Ben Davis are especially susceptible. York Imperial, Smokehouse, Maiden Blush, Smith's Cider, and other varieties, are often severely attacked.

From the work of M. B. Waite, of the Department of Agriculture, supplemented by that of H. R. Fulton, former Plant Pathologist of the Pennsylvania State College, and J. F. Adams, now Assistant Plant Pathologist of the Pennsylvania State College, it has been definitely proved that the fire blight organism is the cause of true collar blight.

In New York practically all of the injury to apple trees at the collar has been said, by Grossenbacher, to be due to frost injury, and this view is at least partially correct. True collar blight is also

prevalent in New York and has been confused with frost injury, apparently.

We also have undoubted cases of frost injury at the collar in Pennsylvania, but this kind of injury does not progress as does true collar blight. Winter injury by freezing may have the appearance of collar blight, but unless the fire blight organism gains entrance afterwards, the injury does not usually extend farther. If the tree is otherwise healthy and the injury by frost not too severe such trees will often recover by the formation of callus growth. On the contrary a tree attacked by bacterial collar blight probably rarely recovers without surgical assistance.

There is also a form of root and collar rot rather common in our Pennsylvania orchards, which apparently is due to an entirely different cause from either collar blight or collar freezing. This form of root decay seems to be caused by a fungus which is closely related to mushrooms. Many kinds of trees are attacked other than fruit trees. The fungus lives on decaying wood in the soil, where it attacks the roots of injured or unhealthy trees. Quite commonly it seems to be associated with collar blight and no doubt comes in as a secondary parasite to that and other troubles. The removal of all infected roots and the same method of treatment in general as for collar blight is recommended.

It is very probable that poor stock and imperfect grafts are important factors in the susceptibility of trees to collar blight. Such stock is likely to produce many root suckers, which are almost sure roads of infection at the collar by the blight bacillus. Imperfect grafts often leave a lesion through which infection readily takes place. Root grafted trees appear to be much more susceptible than top-worked or budded trees. The reason for this may be that the grafts were imperfect or it may be that the stock is more susceptible to blight than the stem. This last theory may account for the fact that there is little correlation between the occurrence of twig and collar blight upon the same trees,—a condition which would hardly be expected.

The method of spread of collar blight is not known with certainty. Apple tree borers are constantly associated with the trouble and it is probable that they spread the blight at this point. The removal of borers from an infected collar and the transferral of the blight organism on unsterilized instruments to uninfected trees in the further search for borers, may account for its rapid spread in some of our best orchards. The importance of sterilizing the instruments used in borer removal should be emphasized here.

Our investigations have shown that it is practical to treat collar blight by the cutting out method *providing* the disease is detected in the early stages before the lesions have progressed too far. It is practically hopeless to attempt to save a tree which has been more than half girdled. Trees having small cankers can usually be saved if care is taken to thoroughly cut out, disinfect and cover the area with a good paint as is recommended for limb or body cankers. Careless attempts at this process will only spread it the more. A gouge-chisel and mallet are the best tools for this purpose. The bark and sapwood should be cut back at least two inches beyond

the diseased area. The cutting may be best done during the fall or spring pruning, but when the disease is detected during the growing period there should be no delay in carefully treating the trees as outlined above. There is little danger in resetting stock where diseased trees have been removed unless the fungus root rot is present.

Bitter-Rot.

Bitter-rot of apples is caused by a fungus known botanically as *Glomerella rufomaculans*. It not only attacks the fruit but also the limbs where it appears in well defined cankers which are one of the sources of infection year after year. The apple is by no means the only host of this fungus, for it has been shown that it attacks pears, quinces, peaches, grapes, and many other plants, and it is altogether probable that it often spreads in nature from one host to another kind of host. This ability to live on many hosts, some of which are uncultivated, makes the disease all the more dangerous to our cultivated crops.

On the apple the disease has been most widespread in more southern orchards of the Virginias, Kentucky, southern Indiana and Illinois, Missouri, and southward, where it often destroys a million dollars or more worth of fruit in one season, and is considered the most serious disease of the apple in those regions. Within the last few years it has been working northward, and is seriously threatening our southern Pennsylvania orchards. Numerous reports have been made of it the past season and undoubted specimens have come to our laboratory for identification.

The disease on the fruit is characterized by producing a brownish to blackish dry decay in a circular outline. On this decayed area, pinkish to whitish masses of spores are produced in concentric circles, a character which serves to distinguish bitter rot from any other rot of apples in our eastern states. See Plate 6, Figs. 2 and 3. The decayed spots are often bitter to the taste in a similar way as are fruits affected by *bitter pit*, a malady which should not, however, be confused with bitter-rot. It should be mentioned that the decay caused by the bitter-rot fungus is often a wet rot, but this condition is caused by bacteria and molds entering secondarily. In the last stages of decay the fruits become black mummies, which may hang on to the tree through winter. These mummies serve to carry the fungus through the winter and cause infection the next season. This fungus is not known to attack the foliage.

The canker stage of the fungus in the limbs is apparently similar to the black-rot fungus in its saprophytic habit of following fire blight infections. In appearance the canker looks like fire blight canker except that the bark is usually much more cracked. The fungus lives over from season to season in these cankers, and consequently they are a source of serious fruit infection year after year.

Weather conditions are very important factors in the rapid spread of the disease. Warm, moist, cloudy weather is very favorable for the germination of the spores and infection of the fruit. The disease is never serious during moderately dry and bright



FIG. 1. An old canker-blight on an apple limb.



Figs. 2-3. Bitter-rot, showing concentric circles of spore-pustules.



FIG. 5. Black-rot mummy showing spore pustules.



FIG. 4. Young canker-blight on apple twig.

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Figs. 2-3. Bitter-rot, showing concentric circles of spore-pustules.



FIG. 4. Young canker-blight on apple twig.

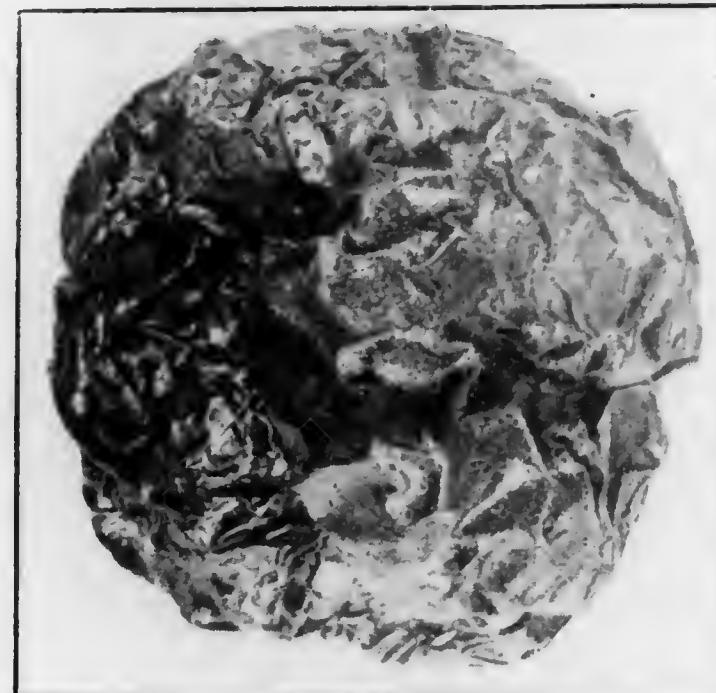


FIG. 5. Black-rot mummy showing spore pustules.

PLATE 6.

weather. The fruit may be attacked at any period from the time it is about two-thirds grown until it is ripe, depending almost wholly upon weather conditions. The spores are rather commonly blown about by winds after copious spore production, and some species of insects which visit decayed fruit undoubtedly spread the infection.

For our conditions in Pennsylvania as regards the present distribution and establishment of this disease it would seem that by promptly destroying the mummies and infected fruits as they appear (which, by the way, is a general sanitary precaution to be employed each year systematically for the control of fungi and insect pests), together with the inspection and removal of cankers at the same time, and by the same methods as employed in fire blight, bitter-rot might be controlled from further serious spread. After bitter-rot has become established spraying is necessary and consists in the application of three or four sprays subsequent to the scab treatment, or beginning about forty days after the petals fall. There appears to be no good reason why lime sulphur should not be as effective as Bordeaux mixture has been if it is properly applied. However, in orchards in our southern states where both commercial lime sulphur and Bordeaux have been tried there is considerable evidence in favor of the latter.

Black Rot.

Black rot, or as it is sometimes called, "The New York Apple Tree Canker" is caused by a fungus which is known specifically as *Sphaeropsis malorum*. Some things we always have with us and black rot is one of these. It appears to be a disease indigenous to North America and has been known for many years. It also occurs widely in Europe.

It is hardly worth while to describe this disease which is known so well to most fruit growers by the production of a frog-eye spot on the leaves and later the black rot of the fruit.

There are, however, some interesting points regarding this disease which should be borne in mind. It rarely if ever produces cankers on its own initiative. *It is almost invariably present on cankers made by fire blight* and it lives over winter in these areas and in diseased fruit which becomes more or less mummified. See Plate 6, Fig. 5.

The spots on the leaves and the infection of the fruit arise from the spores produced and dispersed from these cankered areas, or from black rot mummies which have overwintered in the tree. It seems most unlikely that the fruit is infected from the leaf spots unless it be from dead leaves of the previous year which harbored the fungus.

The same fungus very probably inhabits several hosts in addition to the apple, pear, quince, and other pomes. A perfect stage has recently been demonstrated as occurring upon apple, quince, oak, grape, witch hazel, and other hosts, and it is possible that the fungus may be as cosmopolitan in its habits as the bitter-rot fungus. If so we can readily understand how it has become so widespread.

Black rot should never be even troublesome in a well cared



FIG. 1. Red-cedar stage of apple rust showing a one-year-old gall.
(Courtesy F. D. Kern.)



FIG. 2. Showing the second-year galls on the red cedar after the spore horns have emerged. During this stage after showers an abundance of spores are produced which infect the fruit and foliage of apple. (Courtesy F. D. Kern.)

PLATE 7.

for orchard, which has been thoroughly inspected for the various fire blight injuries and these removed. When it does appear in an orchard, fire blight cankers are almost sure to be present and are a *four fold* danger in harboring, (1) the blight organism, (2) bitter rot, (3) black rot, and (4) the blister canker.

Control measures necessitate then, the *removal of cankers and mummies*. As a safeguard against local infections in orchards where black rot has been serious, two applications of Bordeaux mixture 4-4-50, about August 1, and August 15, should be effective. Lime sulphur in some cases has given good results but not so uniform as Bordeaux has.

Apple Rust and the Cedar Apple.

The apple rust, *Gymnosporangium Juniperi-virginianæ*, is only serious in orchards where red cedars, *Juniperus virginiana*, grow near-by. The red cedar has been used much as a windbreak for apple orchards and as such can hardly be too severely condemned. They are very common also in fence rows where they are annually sown by birds which eat the red cedar berries and drop the seeds.

There is produced so commonly on the cedar a brown gall, called the "cedar apple," about the size and shape of a small buck-eye, that many people think that this gall is the normal fruit of this tree. See Plate 7, Fig. 1. These galls live normally two years, and produce during the second spring and early summer some peculiar horn-like outgrowths bearing spores which are capable of infecting the leaves and often the fruit of the wild and cultivated crab and apples. See Plate 7, Fig. 2. Later in the summer the infected apple leaves develop the typical yellow spots, with black dots in the center, on their upper surface. About three weeks later the second spore stage of the fungus is produced on the under surface of the apple leaves. These spores are disseminated by the wind principally, and if they are carried to the red cedar infection follows resulting in the production of another crop of "cedar apples." The spores produced upon the red cedar cannot reinfect that host nor can the spores borne upon the apple leaves reinfect the apple.

We can understand now how the fungus alternates between its two hosts and why it cannot survive more than two years on the cedar if the two hosts are sufficiently far apart. How far the spores may be wind borne is not definitely known but quite possibly a mile or more.

Control measures necessitate then, one of two methods of treatment. Either the red cedars should be destroyed for a considerable distance about the orchard, or if they are too valuable, as ornaments about the home or otherwise, to be destroyed, the rust may be reduced to a minimum by spraying the apple foliage and fruit during the time the spores on the red cedar are germinating. This requires very careful observation on the conditions of the spore horns on the "cedar apples." As soon as these spore horns become gelatinous during wet weather the spray should be applied to the apple tree and this continued for about three consecutive ap-

plications a week or so apart, depending upon weather conditions. This spray may take the place of the third and fourth applications for apple scab and so require only one extra application for the control of this disease.

Orange Rust of Quince.

This rust, *Gymnosporangium germinale*, was quite severe in some of the quince regions of Pennsylvania this past year. Its life history is very similar to that of the apple rust in that the fungus lives on the red cedar a part of its life history. It may also live on the cultivated junipers. It does not produce large galls on the red cedar and junipers, but instead produces very slight spindle-shaped enlargements usually of the smaller twigs. See Plate 8, Fig. 2. These enlargements are scarcely noticeable from mid-summer until the next spring, when with the warm weather and abundant rains the infected spots swell to several times the normal size of the twig and produce a great number of spores which are scattered by the wind. See Plate 8, Fig. 3. If they find their way to the fruits of quince, hawthorne or June berry they produce infection under favorable conditions, which results a month or more later in the orange rust of those fruits. The rust does not attack the foliage to any extent.

The advanced stage of the rust on the quince fruit is characterized by the formation of several cylindrical columns of spores, which are nearly orange in color and appear about midsummer. See Plate 8, Fig. 1. These columns are sometimes more than one-quarter inch in length and usually about the diameter of the lead in a pencil. The spores are blown back onto the red cedars and produce infection again on that host.

The removal of red cedars and junipers from close proximity to the quinces is essential for the complete control of this disease. There is insufficient data present to recommend definite spraying methods, but it is probable that a similar method of spraying as recommended for apple rust would be effective.

Brown Rot of Peaches, Plums and Cherries.

This disease, caused by the fungus *Sclerotinia cinerea*, destroys millions of dollars worth of stone fruits annually in the United States. Owing to the rapidly increasing development of the peach industry in Pennsylvania, it is very important that the growers of this fruit should be familiar with the best practices in the control and treatment of this serious disease.

The common name of the disease alone is almost sufficient description for its diagnosis, but the production of grayish or olivaceous pustules on the diseased fruits is a further diagnostic character. See plate 9, Fig. 2. The appearance is nearly the same upon cherries and peaches, but upon the blue plums the brown discoloration of the skin is not so apparent.

There are four stages or forms of the disease which are important to recognize. First, the cankers usually on the twigs and



FIG. 1. Quince rust, showing columns which contain the orange-colored spores.
(Photo courtesy of F. D. Kern.)



FIG. 2. Quince rust on the red cedar, showing slight enlargements where spores are produced.



FIG. 3. The same twig after a soaking rain.

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FIG. 3. The same twig after a soaking rain.

PLATE 8.



FIG. 1. Brown-rot on peach, showing infected fruit and twigs on left and healthy fruit and twigs on right.

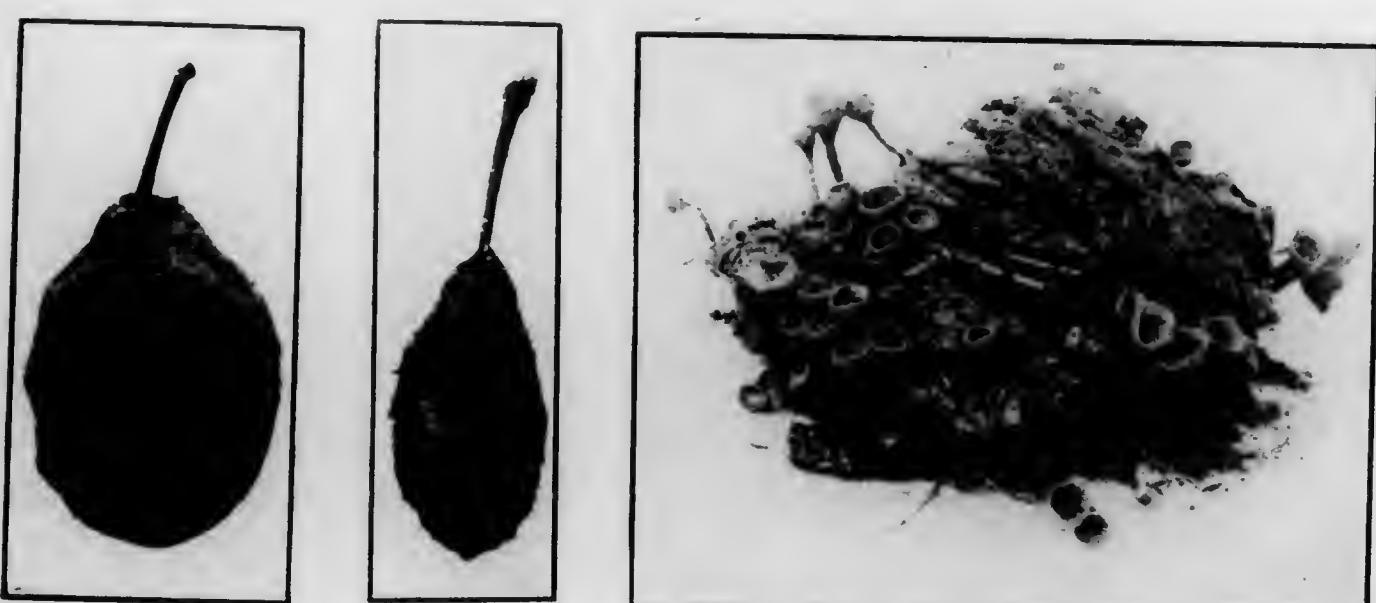


FIG. 2. Brown-rot on plums, showing spore pustules.

FIG. 3. Resting stage of brown-rot fungus on an old peach-pit. These cups usually appear just above surface of soil. (Photo by courtesy of F. D. Kern.)

PLATE 9.

smaller branches; second, the blossom blight; third, the decay of the fruit; and fourth, the "resting" or "perfect" stage that appears on the old mummies which have been shallowly buried in the soil over winter or longer.

The fungus often produces on the smaller limbs and twigs, and occasionally on larger parts of the tree, cankers in which the fungus lives from season to season and produces its spores each season which infect the adjacent fruit. These cankers often produce gum flow on the larger limbs. Small twigs are sometimes killed back several inches as in fire blight. See Plate 9, Fig. 1.

The blossom infection is known to occasion serious loss many years, which is undoubtedly laid to the effect of frost or cold weather at the time of blooming or setting fruit. This kind of infection arises from the production and dispersal of spores from the "resting" stage on the old mummies in the soil.

When the fruit is attacked on the tree it usually remains there and becomes a brown-rot mummy which often hangs onto the tree until the next season or until knocked off. The fungus is capable of living over winter in these mummies and they are a grave source of infection the next season.

If the mummied or diseased fruit is left on the ground and it is covered shallowly with soil for at least one winter and perhaps longer, there may be produced from each one of these mummies a number of small brown, cup-like organs raised to the surface of the soil on stalks of varying length. See Plate 9, Fig. 3. The inside of these cups is lined with a great mass of spores which are discharged with some force under favorable weather conditions. These cups and spores are so timed in their production that they mature just when the trees are in bloom and most if not all of the blossom blight is caused by the infection of the ovary by these spores. It is difficult to find these spore organs for they are small (usually about one-eighth by one-fourth inch in diameter), and so near the color of the soil that they are easily overlooked.

Understanding these conditions the method of treatment for brown rot control is obvious. *First, destroy all diseased fruit and mummies each fall.* Deep burying is perhaps the easiest method of disposal. *Second, remove and destroy all twig cankers during pruning season.* *Third, spray with concentrated lime-sulphur, 1-40,* just before the buds open, then with lime-sulphur 8-8-50 three or four weeks after the petals fall, and continuing for two subsequent applications at two week intervals.

There are several other important diseases of the orchard which might be included here for the benefit of our fruit growers. Such diseases as bitter pit or fruit pit, the Baldwin fruit spot, the Jonathan fruit spot, blotch, sooty blotch, and fly speck, are all more or less important on the apple fruit. The blister canker, which only affects the apple tree, is also important in the older orchards. Peach yellows and little peach are very important, and infected trees should be carefully removed as soon as the owner is sure that either of these diseases is present in his orchard. Gummosis of cherry trees is causing much trouble in some localities, and is being investigated at present. The leaf and fruit spot of quince and pears and the



FIG. 1. Brown-rot on peach, showing infected fruit and twigs on left and healthy fruit and twigs on right.



FIG. 2. Brown-rot on plums, showing spore pustules.

FIG. 3. Resting stage of brown-rot fungus on an old peach-pit. These cups usually appear just above surface of soil. (Photo by courtesy of E. D. Kern.)

PLATE 9.

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scab of apples and pears are causing much damage each year. Peach scab is being investigated at the Wisconsin Experiment Station with some interesting results. In short there are a great number of diseases present in our Pennsylvania orchards which are causing the loss of probably half our fruit each year. There is no easy road to conquer these diseases. The only method is to get down to facts regarding the nature and life history of their causes. In many cases years are required to get this information together.

It is the office of the plant pathologist to assist to the best of his ability in giving information concerning plant diseases to all those who wish it, to assist in co-operative work when feasible, and to carry on independent investigations regarding the diseases or special phases of such problems about which we have no reliable information.

The Department of Botany of the Pennsylvania State College, under which the work in plant pathology is carried on, is at your service in any way you see fit to command us in our line of work.

PLANTING AND CARE OF A YOUNG PEACH ORCHARD.

By C. A. GRIEST, *Guernsey, Pa.*

This subject, I take it, refers more particularly to a commercial proposition and as such the first thing to be considered is the location suitable for the business. In the selection of this location, quality and type of soil are worthy of consideration.

The soil commonly known as "chestnut soil" or in other words, a soil on which chestnut trees grow and flourish, would be my ideal for a peach orchard. When the desirable soil conditions have been found the elevation should be considered, and by no means plant a peach orchard on low level ground. Let us select a location at least 700 feet elevation, although the number of feet above sea level is not so important as to have the other conditions favorable, that is, to have good air and water drainage, so that neither can collect in hollows or ravines, thus eliminating to a large extent the danger of frost injury.

One more important feature in the location of a peach orchard is the accessibility to a good market, either near a market or near a railroad or trolley which will deliver the fruit to the market in a reasonably short time, thus avoiding long hauls and loss in transit. Having decided on the site we come to the selection of trees and varieties. The one year old budded tree is most satisfactory, and should be above the average in size, a good, healthy, vigorous, thrifty tree, with a good, strong root system already developed. Much care should be given to the selection of trees that are free from any root diseases, such as root or crown gall, for after a tree has been planted the roots are lost to view and diseases are hard to cure.

I shall not attempt to name the varieties that should or should not be planted, as I consider that an individual matter for the owner of the orchard. Much depends upon the demands of the

market which he expects to supply and more upon the varieties that are best adopted to his soil and climatic conditions, and also upon whether he desires a long ripening season or a short one. Personally I should prefer a number of varieties that would form a succession in ripening, thus distributing the labor of harvesting over a long period. Mr. Chase has very completely covered the subject of planting a tree and I should not mention the subject at all except for emphasis. The size and depth of the holes depends largely on the condition of the soil, but should be large enough to hold the roots after they have been properly pruned as he described. The tree should be set in the hole and fine, loose ground put in to cover the roots, having the tree thoroughly shaken as it is put in, then tramp tightly as the rest of the hole is filled up, having the earth tight around the roots. Twenty to twenty-five feet apart is a good distance to plant.

This can be determined in a measure by the method of pruning to be employed. The low, wide-spreading tree is the most desirable in having the fruit within easy reach from the ground, making thinning and picking much more easy and more quickly accomplished. After the process of planting is finished I would immediately prune the trees, cutting off all branches and the top, leaving a whip of about one and one-half to two feet in height. In about a month or six weeks after the buds have started I would go over the orchard again and with the fingers rub off all the little sprouts except three or four desired to form the top of the tree. The following spring or one year after planting, we cut those branches off about one foot from the trunk and allow two or three sprouts to grow on each of these. This method of pruning will cause heavy woody growth the second summer and again the following spring we cut away at least half the previous summer's growth; pruning at all times with a desire to spread the tree. This brings us to the bearing age with a low, sturdy, short-limbed, spreading foundation, upon which we grow the wood that bears the fruit, and thus avoid broken trees and the necessity of ladders to pick the fruit.

Cultivation and fertilization are so closely connected in the orchard that it would seem hard to separate them here. The first two years after planting an orchard cultivated crops can be raised between the trees without serious damage to them. I believe that the fertilizer and cultivation applied to such crops as potatoes, melons, corn, cabbage, and tomatoes, is about the same as would need be given the trees, and the returns from these crops should at least pay the expense and perhaps give a profit in addition. During the second summer or fall a cover crop should be sown, preferably a legume. Crimson clover has given us very good results and I believe can be grown on almost any soil if lime is used where necessary. We practice thorough cultivation starting as early in the spring as possible and continuing to mid-season. The cultivation releases plant food making it available and conserves the moisture. It is important on most Pennsylvania soils to keep adding humus and organic matter which a cover crop largely does beside supplying nitrogen and other plant foods.

In caring for a peach orchard probably the greatest enemy is

the peach borer, he is always present and nearly always busy. The best and surest remedy is to dig him out and kill him. We have had reports from men who have controlled the borer by applying a solution of lime sulphur and arsenate of lead to the body of the tree. We have not been successful with this process, but are not ready to condemn it until we have given it a more complete test.

The spraying of a young peach orchard is a very important feature and should not be neglected. The first application just before the buds open with a lime sulphur solution diluted to scale strength destroys the scale and controls the leaf curl which develops later in the season. The thoroughness with which the application is made determines to a large degree the result obtained from the spraying. We have not found that a second spraying has been necessary until the orchard comes to bearing when it becomes necessary to spray the fruit.

This brings us to the bearing age of the peach orchard, and we shall leave further discussion to the next speaker.

Discussion.

Question.—Since it costs so little, less than one cent per tree, would it not pay to spray the young peach trees in the summer time, just on general principles.

Mr. Griest.—I do not believe in spraying at any time unless you know what you are spraying for, and unless the grower knows these things he had better find out before he sprays at all. Haphazard spraying is risky business.

PEACHES FOR THE HOME MARKET.

H. F. HERSHY, *Harrisburg, Pa.*

The peach ranks next to the apple in value of the crop produced. It can be grown profitably in nearly all parts of Pennsylvania with the possible exception of the extreme northern part. It is most extensively and most profitably grown in the south and south-eastern part of Pennsylvania.

Anyone contemplating the growing of peaches for the local or home market has a number of questions to consider carefully. Probably the most important is the question of varieties. Do not grow or rather make your main planting of white peaches when your market demands a yellow peach. Give the market the kind of a peach that it wants and make it the best quality peach of its season. Most markets demand a yellow peach for canning and a white peach for dessert purposes for the white peach is generally better flavored. The question of varieties must be considered from another angle and that is the adaptability to soil and climate.

The best method of finding the varieties that are suitable to your locality and soil is to go to some grower in the vicinity and find out by questioning him the varieties which have paid him the

best. Or another plan is to study the yields of occasional trees found throughout the neighborhood. Another method is to test out in a small way by planting five or ten trees of varieties which are not standard. This is probably the best way to become acquainted with varieties and to test them but it takes time. It, however, should be a part of an orchardist's plan.

The size of the planting must also be considered. It will depend altogether on the size of the market to be supplied and the number of growers already engaged in supplying it. Then, too, the acreage at first should not be too large so that one without any experience will not make costly mistakes on a large scale. The better plan is to go slowly. One point to be kept in mind is that the consumption of peaches may be doubled and even trebled if peaches are sold to the consumer at a dollar per basket instead of one dollar and a half or two dollars and at the same time a handsome profit be realized.

Mr. Griest has brought out very clearly the details of planting a peach orchard and I shall not go into that part of it with the exception of emphasizing a few points. Great care should be taken in the selection of the site for the orchard. There should always be sufficient elevation to give good air drainage. This may seem a simple matter and yet it is of vital importance as orchards located on level grounds or flats are more often caught by late spring frosts than those on the higher elevations. Plantings to be made along a large river or lake are exceptions to this rule for at such a place the air is tempered by the water and late spring frosts are not very prevalent.

Great care should be exercised in the selection of the nursery stock as this is the foundation of your orchard. Good healthy one year old trees from the bud should be bought. I believe that it is the best practise to buy your trees in the fall, then "heel them in" carefully by covering all of the roots and mounding the ground slightly so that the water does not stand around the trees. By following this method the trees are on hand just as early in the spring as needed and there is no delay in setting them out. The roots are not dry having been in the ground all winter and so the trees have a better chance to grow.

My method of tillage is to grow truck crops, potatoes, etc., between the trees fertilizing enough so that the trees are not robbed of their food supply. After that time the trees are given clean tillage in the forepart of the summer and a cover crop is sown later in the summer. I have used crimson clover, common red clover and this last season have used some vetch. My preference is to use a leguminous cover crop but when intercropping and it is too late to sow any of the leguminous cover crops, rye is very satisfactory as it can be sown late and gives a great deal of vegetable matter to plow under.

The orchardist who is growing peaches for the home market should have fruit from the very earliest to the latest so that he can supply his customers throughout the season. With that in mind I am giving a list of peaches in their order of ripening, but do not claim that the list is infallible or that they are the best under all

conditions or that there are not other good peaches. However, they are all standard varieties with the exceptions named.

Greensboro.—There are a number of earlier peaches but the Greensboro is the first of any material value. It is white, semi-cling and fruit often reaches large size. The tree is very hardy and prolific.

Arp. Beauty.—This is a new peach which is coming into great favor and is highly recommended by the Geneva (N. Y.) Experiment Station. It is yellow, freestone and is reported of good quality.

St. John.—Yellow, free. This is the best early yellow peach that we have unless Arp. Beauty will displace it.

Carman.—White, semi-cling. The fruit is large and of good quality and is probably the best early commercial peach that we have. It is very hardy and productive.

Mountain Rose.—White, free. One of the highest quality peaches that we have. Skin is very tender and will not stand very much handling. Must be picked when firm.

Champion.—Creamy white, free to semi-cling depending upon locality in which it is grown. A very high quality peach but is sometimes a shy bearer.

Belle of Georgia.—White, free. Very good in quality and early bearer.

Elberta.—Yellow, free. There are probably more Elbertas planted than all other varieties combined. The fruit is large, quality only medium but it is the best shipping peach that we have. It has been called the "Ben Davis" of the peach family, but it hardly deserves this as well-ripened specimens are much more edible than Ben Davis apples.

Late Crawford.—Yellow, free. This is known as one of the highest quality peaches that we have. It was formerly grown quite widely but less extensively now as it is rather a shy bearer.

Fox Seedling.—White, free. The best white peach of its season. Fruit is only medium in size and quality.

Geary.—Yellow, free. Does best on sandy soils. Flesh is firm and of good quality.

Smock.—Yellow, free. Good quality and good bearer. Will do better on heavier soils than Salway.

Iron Mountain.—White, free to semi-cling. Is only medium in quality but very hardy and for this reason is quite valuable in the colder sections.

Salway.—Yellow, free. Good quality, certain cropper, but will not do well on the heavier soils.

It is as necessary to spray the peach to secure good fruit as it is to spray the apple. The trees should receive the dormant spray for scale either with lime sulphur or a soluble oil. This should be followed by a spraying to control the curculio which causes wormy peaches. Spray as soon as the shucks have fallen from the small peaches with two pounds of arsenate of lead mixed with fifty gallons of water. Two pounds of stone lime slaked should also be added to take up any free arsenic so as to prevent the burning of the peach foliage. If brown rot and scab are present in the or-

chard, these two fungus diseases must be controlled by the self-boiled lime sulphur spray. The earlier varieties need to be sprayed only twice and the later ones three times. The first self-boiled spray should follow the curculio spray at an interval of three weeks. The final spraying should be made three or four weeks before the peaches ripen and if there is a third necessary, it should be midway between the two.

It is one thing to grow good fruit and another to market it to the best advantage. Oftentimes the best growers make noticeable failures in marketing and profits are greatly reduced. Oftentimes goods well marketed may mean the difference between profit and loss.

Marketing will usually be simplified if the fruit is well graded and put in neat, attractive packages. In grading and packing fruit one should remember that good grading and packing does not consist in picking out the best and placing it on top and placing the poorer fruit in the lower part of the package. The top should be representative of the package and at the same time should be "faced" so as to show the fruit to the best advantage. Attractiveness helps greatly in making sales and yet the purchaser is always disgusted if when he examines the package, he finds the fruit very inferior in the lower part. It has been my experience that fruit graded and packed the same throughout in a package giving good measure, will always bring a purchaser back the second time. At the same time, it is always possible to secure the highest price for packages which are not soiled are always an adjunct in securing attractiveness.

In conclusion, the grower who produces fruit of first quality, grades it well and packs it honestly in neat attractive packages, as a rule does not have much trouble in marketing it. Attractiveness along with quality is a good salesman.

Discussion.

Question.—What peach has the longest season?

Mr. Hershey.—Last year we picked Elberta over two weeks.

Question.—Do you grade by hand or by machine?

Mr. Hershey.—By hand. I do not believe a machine is made that will grade carefully enough.

Question.—If you thinned carefully would you have to grade?

Mr. Hershey.—Yes, I believe it would still pay to make more than one grade.

Prof. Surface.—The greatest loss of time I have found is that of grading peaches. It seems to me it is much more economical not to grade. We ought not to have to grade if we grow peaches of the size we should.

Question.—Did I understand you to say you preferred buying peach trees in the fall and heeled them on your own ground over winter?

Mr. Hershey.—Yes, that is decidedly the result of my experience. I do not want trees that have been stored over winter in storage houses or cellars.

H. L. SHANK, Lancaster.

In the fall of 1911 I planted ten acres with apple and peach. The trees had the appearance of being well cared for in the nursery.

Owing to delay in shipment I did not receive them until the middle of November, then bad weather set in and I did not get them all in the ground until the first of December. The apples were one and two years old, mostly one year.

I nipped them back a foot or more to avoid the wind shaking and disturbing the roots. I mounded them up a trifle, but the peaches I did not cut back. The following winter was the coldest the old residents in my neighborhood ever experienced, twenty-two below zero, and how they did watch those trees. Of course I felt a little sick.

The following spring I cut them back to the desired height, with only the loss of a few trees that the mice had killed.

The fall of 1912 I planted fifteen acres more of apple, all one year buds. The results were the same. The spring of 1913 I planted one acre of peach and plum.

Owing to delay in shipments the trees did not arrive in the best of condition. Right after planting the weather became dry and windy. The result was that over fifty per cent. of them died. Had they been planted in the fall with all the winter rains and snows to fix the roots firmly in the ground, I feel sure they would have pulled through all right.

And furthermore, if trees are planted in the fall, while it may take a little extra care in protecting them over winter, you have the assurance of having them in their place when the spring work rushes you.

HOWARD A. CHASE.

In Pennsylvania I would not plant peach trees in the fall. Neither would I care to have them shipped to me in the fall with the intention of heeling them in through the winter. For ordinary fall shipment the nurseryman is obliged to dig peach trees earlier than they should be dug, before the wood is fully ripened. Most nurserymen in the middle states now have frost proof storage houses. These enable them to dig the trees late in the fall after they are well ripened, properly care for them through the winter, and to ship as early in the spring as may be desired. I would let the nurseryman care for the trees the first winter, rather than take the risk myself.

If, however, for any reason one is planting in the fall, see to it that the trees are not dug too early, and after planting bank the

dirt up about the tree at least one foot, leveling the same down in early spring. I would not prune such trees until spring.

JAMES M. MOON.

Much has been said relative to planting in the spring, as that was the natural time for trees and plants to start growing. But my experience covers a quarter of a century and I must say that in southeastern Pennsylvania or middle and southern New Jersey, I have never, but with one exception, known any material injury from planting apples or pears or peaches in the autumn, and I do know that they make a stronger growth the next season by having been planted in the autumn, so as to commence budding out with the first warmth of spring, rather than to be planted some weeks later than this time in the spring, and then have to become established in the ground before breaking forth their new growth.

I consider that there will be fully fifteen per cent. greater growth the first year, from apples and pears and peaches planted in the fall than by those planted in the spring. Consequently, we are justified in running some very slight risk by putting them out in the fall—provided the ground is ready for them. There is more time to do the work in the fall. The nurseryman has more time to dig and fill the orders properly in the autumn and also has a fuller stock of trees to select from than in the following spring.

I have more than once seen winter injury to cherries set out in the fall, and, I believe, the only proper time to plant these for commercial purposes is very early in the spring.

I have known quinces to be quite severely injured by planting in the fall.

As a general principle, I would recommend planting nearly all hard wooded trees in the autumn, if you can get prepared for the work at that time rather than waiting until the following spring.

All nut trees, oaks, beech, hard maples, elms and buttonwood, do well if set out in the fall. Most varieties of flowering shrubs, with the exception of viburnum and a few other sorts which grow late in the season, and do not have their wood well ripened, might also be successfully planted in the fall.

Soft maples and also Japanese maples should be put out in the spring, as well as a few other soft wooded trees.

Conifers as well as rhododendron and other broad leaved evergreens should be planted in the spring and not late fall, although they would frequently succeed admirably if planted in the late summer or early autumn, while the weather is warm.

I believe there would be less loss of trees if more of our orchardists in southeastern Pennsylvania would put out their apples, peaches and pears in the autumn, but I am not advising this practice to the fruit growers in the northern part of our State.

**PHASES OF MANAGEMENT IN THE COMMERCIAL
APPLE PLANTATION.**

J. A. RUNK, *Huntingdon, Pa.*

The economical management of a fruit plantation involves a practical working knowledge of much more than simply growing trees. There are problems in starting the plantation which, if worked out satisfactorily, lend much to the later success of the proposition. I refer to such problems as are presented in selecting the site of the orchard, with regard to soil and air drainage, soil composition and organic content, drayage and transportation facilities, and such other fundamentals which should always be carefully considered before the orchard is planted. In these times of enormous interest and resultant large plantings to apple trees, many are ignoring these most important phases which influence the management of the plantation in the future. Frequently I tell the prospective commercial grower that half of the problems in management should be solved before the orchard is planted.

Purchase of Trees.

The first subject which I shall take up in detail will be the purchase of trees for the large plantation. Purchase good, strong, well grown, vigorous, one-year-old trees, which are from three and one-half to five feet in height, either budded or whole-root-grafted. Personally, I prefer good, clean budded trees because they have a larger and better developed root system and will, therefore, withstand the hardships of transplanting better and will push the tree into a more vigorous growth. The whole-root graft is superior to the piece-root-grafted tree because they have a better root system. Trees, especially one-year-olds, are now mostly graded by height rather than by caliper, because what constitutes a first-class grade caliper in one variety cannot be attained to in another variety, *e. g.*, one-year Stayman Winesap tree is stocky, while the same aged Jonathan or York Imperial is very slender. In height they do not vary so much. In purchasing one-year-old trees of best grade you always get the choice of the nursery, the smaller trees being held over to produce two-year old stock for the retail nursery trade in most instances. The root system of one-year-old trees are not mutilated so much in "cutting loose" with the tree digger which is used in the large commercial nurseries, hence they suffer less shock in transplanting and start into growth very promptly. To my mind, however, the most important reason for purchasing one-year-old trees for the commercial plantation is the fact that the owner can head the trees to suit his needs and to satisfy his preference. If he knows the habit of growth of his varieties as he should know them, he can head the tree to suit its growth habit. I am convinced that in order to secure the color and quality of apples which we desire from our eastern plantations, we must grow a more open headed type of tree.

Later Pruning.

Later care and pruning of the trees must be such that a plentiful supply of air and sunlight can reach every branch of the tree. In place of "mowing" off the tops of our trees we must study their habits of growth and thin out the tops by cutting to side branches and then cutting back as is required to keep the tree within bounds. The production and conservation of fruit spurs is a subject which is terribly neglected. Only a few commercial growers seem to realize that apples can be produced only from highly specialized fruit buds which can only develop on the fruit spurs, therefore, all pruning must be adapted to the development and protection of these spurs. Very frequently careless or indifferent pickers destroy many fruit spurs which should not be lost. The careful cutting out of canker and rot blights and fire blight, when it occurs, is a very important phase of orchard management. Good management consists in prolonging the bearing life of the orchard as much as possible and there is nothing which weakens the vitality of the trees and shortens their life more rapidly than the cankers and blight. Careful and consistent spraying is a powerful adjunct to the pruning knife in preventing such ravages in our young orchards.

The Conservation of Moisture.

It is my personal observation that the available supply of moisture limits the production of apples in the commercial apple orchard more frequently than any other phase of summer management. It is not my intention to discuss the relative merits of the sod mulch and clean cultivation methods of managing the bearing orchard, but I do note that a good mulch frequently gives a much greater and more regular supply of moisture to the trees while they are maturing crops of fruit than the indifferent cultivation methods which many commercial growers practice. It is mighty important that a good earth mulch of at least three inches deep, be maintained in the orchard until the fruit is fully matured if we are to get the greatest returns in bushels of good fruit. I will admit that a cover crop must be grown but I am not ready to admit that the cover crop growth or the lack of cultivation must be permitted to rob the tree roots of a bountiful supply of moisture. Frequently we see bearing orchards laying bare and solid during the months of August, September and October. Under such conditions and with such weather, as we frequently incur during these months, the evaporation of moisture may be tremendous. Such loss seriously affects the quantity of fruit which the orchard can produce.

Cultivation Tools and Methods.

It is scarcely the province of this paper to discuss cultivation in all its details. The time could not be granted. However there are several important details which I desire to place before you for careful thought and consideration.

In the first place I want to raise the question as to whether

our Pennsylvania fruit growers are using enough up-to-date orchard cultivating machinery. My observation has been that the great majority of our orchard cultivation is being done with only the turning plow and the spike and spring-tooth harrow. The general farmer may get along with these few tools, but our most progressive farmers do not attempt to do so—neither should our fruit growers. In the preparation of the orchard for planting the turning plow has its place, but for the later plowings there are several good makes of light gang plows carrying two or three light steel plows which may be operated by the average two horse or two mule team, and with which three to four acres may be turned each day. They have the additional advantage of permitting close plowing to young trees, because of their "extension" construction. Then, too, the ground may be plowed thoroughly without leaving the large unworkable finishing furrows between the rows and without ridging the soil so much in the tree rows.

Disc harrows with extension frames should be a part of every orchard's cultivating equipment. These may be had with both single or double gangs of discs. The double acting tools have a decided advantage for orchard cultivation because they leave the land practically level, whereas the single acting tools leave the land quite irregular. The extension frame permits the driver to keep his team away from the trees far enough to prevent injury while he is cultivating right up to the trunk of the tree. For my own use I find the "Cutaway" type of disc very satisfactory for orchard cultivation.

The Acme harrow, equipped with an extension frame, has given very good satisfaction in my own orchard. Its cutting blades fine up and pulverize the soil, leaving an ideal earth mulch in its wake. It may be equipped with spring teeth, thereby making a very satisfactory extension frame spring-tooth harrow.

No orchard is completely equipped with cultivating tools which does not contain one good orchard cultivator, either of the type of the Farkner cultivator, or of the Planet Jr. tool. Either of these tools are light in draft and cover the ground rapidly, forming a good earth mulch. They conserve both man and horse labor in cultivation work.

What constitutes good cultivation methods in a commercial orchard? The primary object of cultivation in the orchard is the conservation of moisture (see following discussion), therefore, the plowing or stirring of the soil should take place quite early in the spring and such cultivation should follow with the aid of the tools discussed above, as will maintain an "earth mulch" three or four inches deep throughout the growing season. The character of the soil and the manner of the rainfall will largely determine the number of cultivations which will be necessary each season.

Spraying.

We need to do more intelligent spraying in Pennsylvania. We must study to know what we are spraying for and then we will know what spray-material to use and when to do the spraying.

Whether we have scale insects or not, there should be one dormant spraying made with concentrate lime and sulphur solution, either commercial or home-boiled. This helps to keep the bark of the tree healthy and vigorous. When "Black Leaf 40" or some similar tobacco product which is injurious to aphis, is used with lime and sulphur and the spraying is done in the spring just before the buds begin to open, the winter forms of the aphis may be destroyed and the insects thus largely controlled.

Careful and persistent spraying with arsenate of lead is the only means for controlling the codling moth. In many of our fruit sections there are yet sufficient old and neglected orchards to make the codling moth an ever present enemy. The new angle nozzles, the spray rod and the spray tower are splendid auxiliaries for fighting the codling moth. For the second brood spraying, the arsenate of lead should be mixed with summer strength or self-boiled lime and sulphur.

The curculio is doing a great deal of damage in many of our isolated orchards. A second spraying with arsenate of lead should follow the first codling moth spraying by about two weeks so as to keep the small fruits covered with the arsenical spraying to combat the feeding of the curculio.

I have found by personal experience that it is an exceedingly difficult proposition to rid old trees of San Jose scale with lime and sulphur, especially when they are badly infested. In such cases I have resorted to the use of the scalecide with success. The miscible oil spray spreads over the entire tree when same has been well sprayed. With the lime and sulphur spray, the entire surface area must be covered.

In connection with spraying, I should like to emphasize the fact that Bordeaux mixture should be used on all old trees to control the cankers and the bitter-rot. I saw a good crop of Grimes' Golden apples from eight year old trees go down with bitter-rot two years ago. It could have been saved with Bordeaux. There are too many old neglected orchards in most sections of our State for us to abandon the use of copper sprays. Personally I think that at least two sprayings with Bordeaux should be given, one in the early spring and one during the late summer season.

Thinning of Apples.

There is no question but that the eastern commercial grower should aim to grow a maximum amount of well colored fruit of the first grade. To do this systematic thinning is very necessary. It is true that even picking of the mal-formed and infected fruit will help greatly, but we must practice an actual thinning out of the fruit to secure the results we need. Thinning to eight inches is not too much for the most of our varieties, in fact such thinning usually pays for itself well. If we keep our trees headed low and the tops well opened by pruning, the thinning work may be greatly facilitated. Thinning should be done in our territory in June as far as possible to secure the greatest results.

Storage Problems.

The last subject which I shall discuss will be storage problems. In the future, gluts in the apple market are sure to occur. With the present rate of planting it cannot be otherwise. The commercial grower who is to make a success of his work and reap the profits which are due him must be prepared to control a large percentage of his product when such gluts occur. Then, too, the commercial grower must be independent of the unscrupulous dealer who tries to force down prices during the fall selling season in order that he may secure great profits.

There are two means of avoiding the above conditions. One is to provide temporary storage for your apples and place them in cold storage as soon as possible, the other is to build storage plants on the fruit plantation and store large quantities of fruit there. Local and home storage plants are working successfully in other sections and they may be worked successfully in Pennsylvania. The Gravity Brine System of storage seems to me to be admirably suited to this class of storage. It is economical to build, also to operate. Suitable cave or cellar storage may be worked out for several thousand bushels of apples on almost every plantation. I know of several such storage cellars which are netting good money for their owners every year because they are enabling them to dispose of practically all of their fruit on their home markets at a good net profit.

MARKETING FRUIT—A FAMILY PACKAGE.

HOWARD A. CHASE, *Mount Pocono, Pa.*

Where there are large orchards and a live local association such as our friends in Adams County enjoy, the question of marketing fruit is comparatively simple, but those of us who have not the benefit of associations of this character, and are in sections where the orchards are few and far between, are obliged to look up our own markets. The question of distribution is then all important.

I recall that in the fall of 1912, Scranton was literally flooded with apples. They were shipped there in barrels and baskets, in boxes and in bulk. During this same time there were places in this and adjoining states where there was a scarcity of apples and prices were high.

I realize the practical difficulties of local marketing associations in the majority of the counties in this State, but it seems to me that possibly an information bureau might be established in the Division of Zoology of the Department of Agriculture so that our fruit growers could be informed as to where to ship their fruit to advantage. I am quite certain that the railroad companies would cheerfully co-operate in work of this kind.

As to a family package, I realize that for general commercial purposes, especially for the export trade, the standard three bushel barrel is likely to continue to be in demand, but for fancy trade the bushel box has come to stay. Now cannot we find still another

package, a package the use of which may result in the greater consumption of apples in the average family? Why not try a two bushel barrel, this especially for what might be termed second size of fruit, but fruit of first-class quality. Then attach to each such package a card, telling how the fruit can be preserved from decay in an ordinary warm cellar, by simply taking out the head and keeping the barrel covered with damp burlap.

I believe that with a package of this kind the provision man would be able to induce a large percentage of his customers to buy an unbroken package. Possibly in some markets the bushel hamper basket might prove to be a popular family package, provided, the same is lined with paper.

Let us try to find something that will break up this half peck and quarter peck purchasing habit that so many people, even well-to-do people, have gotten into.

A SATISFACTORY HOME APPLE STORAGE.

By H. C. BRINTON, *Hanover, Pa.*

I sell most of my fruit in a nearby town and had no means of storing my winter apples. For a couple years I stored it in the York plant, about twenty-five miles from here. This I found inconvenient and expensive, because it meant delay in getting fruit out and a double freight charge on account of having to haul it back to my home town. All of this brought to mind the need of a home storage plant or cellar.

For perhaps a year I hunted round carefully for information, in order to find out what such a cellar can be expected to do and what it will not do.

I found little information was to be had. If I remember correctly, I found about four descriptions of fruit storage houses in the fruit papers, from each of which I gathered some little details of value. As we all work under different conditions, I did not find any storage house that just suited my conditions. In Farmers' Bulletin No. 97, Exp. Sta. Work No. 10, I found a description of two or three methods for cooling cheese rooms by means of underground air ducts. I will speak of these later, and how I partially adopted one method.

We soon learned, two of the essential features of a storage plant or cellar for apples, are good ventilation and a certain amount of humidity, aside from maintaining a low temperature.

Perhaps I may seem a little long winded in my preliminary descriptions, but to me these are indeed the most important, because when we once know what we want, and what we want to do, the actual construction is a simple matter.

With my conditions I selected a steep hillside facing south. Unfortunately, that I could not help. However, by digging into the hill I could get a thorough insulation on three sides of my cellar and by using a hollow concrete block for the front wall also get better insulation than from a solid wall.

The whole cellar is of concrete throughout. The side walls are ten inches thick, and about eleven feet high, with an arched roof of reinforced concrete, five inches thick. The roof has about a two and a half foot arch. While a double wood wall packed, or lined with paper, would perhaps give the best insulation, it would not be as durable and I feared too dry. In the cement walls we used a three-quarter inch stone without any sand, this makes a very porous coat that excludes the air but moisture will come through. However the walls do not sweat as with a stone wall, perhaps due to the ventilation and circuit of air.

In order to get our temperature (and we try to maintain same at about thirty-four degrees), we partially depend on the air ducts as described in Government Bul. No. 97. These are simply lines of terra cotta pipe running down through the ground and into the cellar. Unfortunately we struck rock and did not make these lines as long as we desired because our apples were almost ready and the work had to be pushed. The government advised laying the pipes for a distance of 100 feet underground in order to thoroughly chill the air. Ours are so arranged we can do this at a later time if need be; now they run down parallel to and about three feet from, the side walls for perhaps six feet, then into the cellar. There are six sets of these pipes, two sets along each of the three side walls consisting of two pipes, a four-inch and a six-inch, in each set. By using two small pipes instead of one, say ten-inch pipe, the air has a better chance to chill.

To complete the circulation we purchased a ventilator (the makers call it a cowl), from the Pullman Aut. Vent. Mfg. Co., at York. This I find does excellent work, by testing we find it draws the air from all parts of the room quickly, keeping up a constant circulation. The government suggests using a stack for this purpose. A stack long enough is rather expensive, while the cowls are quite reasonable.

As we have only had the cellar in operation this season, I cannot give any data as to temperatures. However, can say since cool weather set in, in the fall or early winter, we have been able to maintain a temperature of about thirty-four degrees, and reasonably uniform. It seldom gets above thirty-eight, but during a cold snap I left ventilators open and it dropped to twenty-six. As we wished to use some fruit at once we put a small stove in and soon had a normal temperature. In a day or so we could see no bad effects from the low temperature, being careful in the meantime not to handle fruit.

We rather expect to have a little trouble in the fall at picking time, to get proper temperature. In order to meet this we have arranged to place an ice rack in the centre of the cellar, overhead, that will hold five or six tons of ice, and hope by means of one icing to start our temperatures and then maintain them by opening ventilators on frosty nights and closing them during the day.

The ice rack is so arranged that the cool air and drip will come off at the sides, the water is carried away by means of spouting and underground drain. The cement floor was given a slight pitch in order to carry any water to the drains.

Originally we intended putting a paper roof about two feet above the cement roof. Making it tight on three sides, with ventilators in the fourth or front side; then by placing a cowl on the roof at the opposite end, we hoped to keep our cement roof cool; but on the suggestion of a friend we will first try covering roof with dirt and perhaps plant grape vines on same for shade.

The cellar is twenty-four feet, six inches by thirty-seven feet long inside, divided into two rooms as before mentioned, with an approximate capacity of 2,200 bushels. The front room is about one-third as large as rear room. This we use to chill fruit in, as the fruit comes from the orchard, and hope by so doing to help keep down the temperature of the rear or main storage room.

After all the fruit is in we expect to use this front room also for ripening fruit, by keeping it warmer than rear room. In selling to the local market there is a weekly call for apples, even for some of the late keepers, these we hope to mellow up in this warmer room.

In front of the cellar proper we have a ten foot landing platform, with a cement floor on same level as our cellar floor. This is about two and one-half feet above the driveway. Teams can drive along side and by means of a movable gangplank fruit can be trucked right from the wagon bed.

We have a paper roof over this platform and driveway that shades front of cellar and protects teams and men when loading market wagons in rough weather.

The cellar cost about \$900. I used most of my own stone off of the fields, hiring a crusher to break them. This I found to be quite a saving where you have the proper kind of stone.

On account of the variety of conditions we meet no doubt a similar cellar could be built elsewhere for less money. We struck a soft rock that made my excavating charges higher than we expected. We did most of the work with our own help, but employed a cement worker with three helpers for the cement work.

In this we believe his experience overcomes what we would have saved by using cheaper help.

After the past winter's experience, judging from the way the apples kept, and from those we now have (for our own use), we can say the cellar is very satisfactory and a big convenience.

Should any members or friends desire further information about the cellar we will be glad to have them call at any time and inspect same. The farm is just four miles north of Hanover, right along the Abbottstown pike, so we have a good road the year round.

AGRICULTURAL EDUCATION.

BY DEAN R. L. WATTS, *State College*.

MR. PRESIDENT, LADIES AND GENTLEMEN: I have been requested to speak on the subject of Agricultural Education, with special reference to the work of the Pennsylvania State College. As a State institution, supported mainly by State appropriations, all classes of soil tillers are naturally interested in its activities.

The work of the Pennsylvania State College is divided into five schools, namely: School of Agriculture, School of Engineering, School of Liberal Arts, School of Mines, School of Natural Science, and Department of Home Economics. In the School of Agriculture, there are 780 students taking four years' courses; 158 students in the two years course; 11 special students, and 176 students pursuing the winter courses, which make a total of 1,125. The accompanying chart shows the increase in the enrollment of students during the past decade. Facilities for instruction are provided by farm properties aggregating 1,244 acres (Plate 1, Figs. 1 and 2); large numbers of dairy cattle, beef, cattle, hogs, horses, sheep, and poultry; numerous experiments embracing every branch of agriculture; agricultural and horticultural buildings containing class rooms, offices, and laboratories; a dairy building complete in its equipment of offices, laboratories, butter and cheese making rooms, and other facilities for the manufacture of dairy products; a forestry building and woodlot; orchards and vegetable gardens; a general college library, and a special library, the latter being located in the agricultural building; two ranges of greenhouses, and a campus of about 100 acres.

The Extension Department of the School of Agriculture has been supporting the County Agent movement, and nine counties of the State are now organized. This department has also been active in holding Farmers' Weeks, and special meetings, in organizing corn clubs, in conducting special excursions to the college, and in other forms of agricultural extension, with a view to assisting those who can not come to the college for instruction.

The Department of Agricultural Education is also doing good work along extension lines. Its efforts are directed mainly along two rather distinct lines, namely, the Correspondence Courses in Agriculture, and Agriculture in the Public Schools. Since the Correspondence Courses were established, fifteen years ago, almost 15,000 citizens of the State have received instruction by that method. The number actually receiving instruction during the year 1913 is estimated at 4,000, and about 1,700 of this number are new students who were enrolled during the year. Each Correspondence Course comprises from five to ten lessons on some particular subject relating to the farm or to the farm home. During the past year, instruction has been given in thirty-five different courses.

The Summer Session of six weeks was established for the primary purpose of giving instruction to the teachers of the State. One of the important courses of this session is Agriculture, and large numbers of teachers are annually receiving instruction at the college in this subject, which is becoming more and more important in the public schools.

The members of the Horticultural Association are most interested, of course, in the experimental work of the college, and the following brief notes will convey some idea as to the line of work followed and the results obtained.

(Since a large number of lantern views were used in connection with my lecture at the meeting of the Horticultural Association, the remarks were necessarily disconnected, and, therefore, not adapt-



FIG. 1. On one side of the fence. A field of wheat grown on grounds of The Pennsylvania State College farms.



FIG. 2. On the other side of the same fence. A field of wheat grown by tenant farming on field adjoining field shown in Fig. 1.
PLATE I.

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able to publication without using the accompanying illustrations. Therefore, the various departments of the School of Agriculture have kindly prepared at my request the following statements which relate to the work of the Experiment Station:

The Agronomy Department.

The Agronomy Department is conducting many field experiments along lines of soil treatment, crop rotation, variety studies, and the improvement of various farm crops by breeding. The most interesting experiment is our "General Fertilizer Experiment," which is famous among investigators as the longest continued fertilizer experiment in America. This has been carried on for thirty-two years. In this experiment there are used 144 one-eighth acre plats. Here are compared the effects of single fertilizing ingredients, of combinations of two ingredients, and of complete fertilizers; also the effects of lime and manure used separately and together. See Plate 2, Figs. 1 and 2. Some of the most striking results obtained are as follows:

Of the single ingredients, phosphoric acid has given a considerable increase in yield over the nothing plats, while nitrogen and potash have given no increase.

Phosphoric acid and potash combined in a commercial fertilizer, without any nitrogen in this rotation containing clover, have given as good yields for the last few years as they gave thirty years ago.

Complete commercial fertilizers have given as good yields as barnyard manure.

Lime alone has not maintained the productive power of the soil, but lime with manure has given high yields.

Of the different carriers of nitrogen, nitrate of soda has given the best yields.

The Experiment Station has demonstrated the value of top-dressing of commercial fertilizers on timothy sod. Three hundred and fifty pounds of a 7-7-7 fertilizer applied in the spring, just as the growth was starting, has given an average yearly increase in field-cured hay of nearly 1,600 pounds per acre, besides improving the land for the next corn crop. (See Plate 3, Fig. 1.)

Alfalfa has been grown on the college farms for a number of years. There is now being grown about thirty acres, a part of which is under experiment. Nearly every year three cuttings have been made, and its value as a forage crop in Pennsylvania has been proved. One small field was cut from 1904 to 1912, and it gave an average annual yield of about four tons of field-cured hay per acre.

Timothy breeding work is carried on with the idea of developing superior varieties of this valuable plant. Timothy is quite variable, and it seems possible to develop varieties of it that are as distinct in appearance and adaptability as are many varieties of wheat or oats. This breeding work requires the study of individual plants, and for this purpose there are being grown in the nursery between 8,000 and 9,000 plants. (See Plate 3, Fig. 2.) One strain now being tested under field conditions has outyielded commercial timothy by 555 pounds of field-cured hay an acre per year for the last two years.



FIG. 1. A view of some of the plats in the general fertilizer experiment. There are 144 one-eighth acre plats used in this experiment. It has been continued for 33 years.



FIG. 2. Three plats in above experiment in rotation of corn, oats, wheat and clover and timothy. Plat on left received six tons of manure every other year and two tons of burned lime every fourth year. Plat in middle received two tons of burned lime every fourth year. Plat on right received nothing.

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PLATE 2.

Plant breeding is also carried on with oats, wheat, corn, and potatoes.

Many problems relating to soil fertility are best studied with pot cultures, and field experiments can also be checked by such methods. The pots may be kept in the greenhouse in winter and out of doors in the summer. At present, there are being carried on in this way investigations on the relative effect of pure and magnesian limestone when applied to the soil in varied degrees of fineness, and in comparison with the equivalent amounts of burned lime; also the influence of varied amounts of limestone upon the growth of sorrel and clover.

Animal Husbandry.

The experiment in Animal Husbandry are such as seem of most importance to the live stock industry in the State of Pennsylvania. One of the experiments now being made is that of "Maintaining Beef Breeding Cows in Pennsylvania." The object of this experiment is to determine the cost of keeping beef breeding cows on a ration made up largely of roughage such as is grown in abundance on Pennsylvania farms. Two lots of animals, composed of ten pure-bred Shorthorn and ten Aberdeen-Angus cows, are used in this test. This experiment was begun in the fall of 1911, and the results thus far obtained seem to indicate that beef breeding cows can be successfully maintained if they receive all the corn silage they will consume during the winter with an additional pound of cottonseed meal per head, daily, and good blue grass pasture during the summer. All of these cows have kept in excellent condition, and have shown no ill effects from the rations fed. The calves that have been born are strong, healthy, vigorous individuals, and were fully developed at the time of birth. The total cost of feed, labor, and other expenses involved in the maintenance of the cows, has ranged from \$25.00 to \$30.00 a head, per year.

Steer feeding experiments have been conducted for a number of years. The experiments indicate that steer feeding can be successfully carried on in Pennsylvania if the proper method of feeding is followed. During the past five years, 178 head of cattle have been fed in an experimental way; they have given a profit of \$5.00 per steer, although market prices for all feeds consumed were paid and they have returned ninety-eight cents a bushel for all corn consumed. Five lots of cattle are on experiment this year. The object of this experiment is to secure further information concerning the proper method of steer feeding. One lot of steers is fed what is commonly known as the Pennsylvania ration. This ration is composed of three parts corn, one part wheat bran as the grain feed, and all the corn stover and mixed hay the cattle will consume. During the first two months of the experiment, it cost \$11.82 to produce 100 pounds of gain in this lot. Another lot is fed a ration, which has previously been found to be economical, and which has given good results. The cows in this lot are receiving all the corn silage they will consume, together with two and one-half pounds of cottonseed meal per 1,000 pounds live weight daily. This is fed



FIG. 1. Showing the effects of a 7-7-7 fertilizer applied to timothy just when growth starts in Spring. On the left unfertilized. On the right, 150 pounds of nitrate of soda, 150 pounds acid phosphate and 50 pounds muriate of potash.



FIG. 2. Timothy breeding plat—conducted by Department of Agronomy of The Pennsylvania State College.

PLATE 3.

during the first fifty-six days, at the end of which time ear corn is added to the ration. During the first fifty-six days, the cost of making 100 pounds of grain in this lot was \$6.52, as compared with \$11.82 in the other lot. Another object of the experiment is to determine the value of alfalfa hay, instead of cottonseed meal, as a source of protein. The present indications are that the alfalfa hay will make a desirable substitute.

In accordance with the increased interest in hog production in the State of Pennsylvania, the department is conducting an experiment to determine the best methods of pork production. Tests are being made to determine the value of pasture for growing pigs as compared to growing them in dry lot. Last year it was found that the cost of producing 100 pounds of gain in growing pigs, kept in good pasture, was \$5.70 per 100 pounds, as compared to \$7.00 per 100 pounds for pigs kept in the dry lot; furthermore, the pasture lot seemed to be thriftier and it made heavier daily gains.

Another experiment has been conducted to determine the advisability of the practice of hogging down corn. One group of ten hogs was kept in the corn field from the middle of September until the time of marketing, while another group was fed in the dry lot. It was found that the hogs kept in the corn field gained 1,222 pounds in ten weeks, while the hogs that were fed in the dry lot gained 1,014 pounds during the same period. Tankage was supplied to each lot in addition to the corn consumed. The hogs that were kept in the corn field made 12.3 pounds of gain per bushel of corn, with less labor involved, while the hogs fed in the dry lot made 11.6 pounds of gain per bushel of corn consumed. These feeding tests will be duplicated next year so as to obtain further information along this important line.

Another experiment in progress at this time is to determine the cost of producing fall pigs as compared to spring pigs.

Investigations are conducted with the college flock of sheep. The principal experiment in progress at this time is to determine the cost of maintaining breeding ewes and to secure information concerning the best ration for lamb and wool production.

Department of Botany.

The experimental work of the Department of Botany has been conducted chiefly along the line of plant pathology. The reason for this is the great economic importance of this line of investigation. The chief activities have been directed to the problems represented by the following projects. Results within the year upon the first two projects are especially gratifying, and it is believed that practical information can soon be furnished to the people of the State on these subjects.

Collar Blight.—This is locally known as "collar-rot" and was first reported in this State in 1907, since which time it has been under investigation. It is now widespread in this State, as well as in neighboring states, and is one of the worst diseases with which our orchardists have to contend. It is characterized by a progressive death of the bark above and below the ground line, often ex-

tending to the root-system. Young trees, from eight to fifteen years old, are especially susceptible. No varieties appear to be entirely resistant. Inoculations indicate that the fire blight organism (*Bacillus amylovorus*) is constantly associated with it. This disease is, therefore, but one of the several effects produced by the blight organism, the others being twig blight, blossom blight, and limb cankers. The apple tree borer has been found to be associated with the disease and is probably one of the most active agents in the spread of the causal organism. Control measures by the cutting out method are practical during the early stages of attack.

Winter Blight of Tomatoes.—This is a disease of tomatoes grown under glass; it has been under observation in the vicinity of Kennett Square, Pennsylvania, since the winter of 1910. The trouble is very similar to what is known as mosaic, and the most conspicuous symptoms are the curling, spotting, and dying of the leaves. Our recent results indicate that the trouble is chiefly one of malnutrition, and that by a modification of the present treatment of the soil and greenhouse management, it can be largely overcome. The association of a casual organism is still somewhat uncertain, but it seems likely in any event that control measures may be divided.

Smoke and Soot Investigations.—As a result of a co-operative arrangement with the University of Pittsburgh, some valuable observations have been made concerning the effect of smoke and soot upon vegetation. Many inquiries are received seeking information upon this subject. We now have a nucleus from which to work, including lists of native and introduced plants which thrive well in spite of smoke and gases, and those which do not.

Plant Disease Survey.—A most valuable work is being carried on from year to year regarding the occurrence and distribution of plant diseases. Especial attention is given to new and unusual pests. This not only will form an important guide for the selection of problems in the future but might form the basis of a valuable publication for distribution to the people of the State.

Department of Dairy Husbandry.

For four years, the Dairy Husbandry Department has been experimenting on the need of housing cows in winter. For the purpose, two groups of cows of equal number, and as nearly similar in all particulars as possible, have been selected. One group has been kept in a shed open on one side only, and the other group has been housed in a barn typical of central Pennsylvania. The feeds have been of the same kind, and have been fed in proportion to the amount of milk given by the cows. This experiment will be tried again in the new barn, now in process of construction, and an open shed, before the final conclusions are drawn. It may be tentatively said that, contrary to expectations, the food of a dairy cow seems to provide her with sufficient warmth, and to enable her to produce a medium amount of milk.

An experiment was recently started with a view to the study of dairy herd management subjects. Figures on every item of cost in

dairy herd management are being compiled. As a result of a collection of data covering a series of years, it will be possible to submit average figures for the various factors of cost in herd management, such as bedding, labor, raising of calves, food, and amount of depreciation.

Mechanical cow milkers have been under experiment for a number of years. Some of the problems considered are the number of bacteria in hand- and machine-drawn milk, the effect of machines on cows, the efficiency of the machines, and the actual saving of labor.

In the hope of demonstrating the practicability or desirability of feeding silage alone as roughage to dairy cows, an experiment is in progress in which one group of animals receives silage only, while another receives hay and silage. Two lots are being fed grain rations consisting of the two feeds corn and cob meal and cottonseed meal during one period, these feeds being alternated to a ration of four grains in order to study the effect of variety.

Experimental Agricultural Chemistry.

The Department of Experimental Agricultural Chemistry is charged with the analytical work connected with the fertilizer control, and with a portion of that relating to the work of the Dairy and Food Commissioner; this work is performed under contractual relations between the Experiment Station and the State Department of Agriculture. A very large fraction of the working time of the Department of Experimental Agricultural Chemistry has been devoted to such work, but it has, nevertheless, performed in addition a very considerable volume of experiments upon a variety of subjects, involving the relations of chemistry to agriculture. It has, for example, made an extensive study of the limestone resources of the State, particularly with relation to the composition of the limestone developed in various localities.

Attention will be here confined to two lines of work conducted by this department:

1. A study of the influence of fineness of grinding of limestone upon its value as a soil amendment in substitution for lime.

2. Tobacco experiments, which are made under special appropriations, in co-operation with the organized tobacco growers' societies in the various principal tobacco producing counties of the Commonwealth; the direction of these experiments is, by law, vested in the Experiment Station, and placed in charge of the Department of Experimental Agricultural Chemistry. During recent years the station has had the valuable co-operation of the United States Bureau of Plant Industry in this work.

Experiments on the influence of fineness of limestone upon its value in neutralizing sour soils: Since the use of crushed limestone has come again prominently to the attention of the agricultural public, there has been a great diversity of judgment as to the fineness to which the stone should be reduced, to enable it to produce the best and most economical effect. Thus some writers in other stations have commended only such material as would pass an eighty-

mesh sieve, that is, particles of not more than one-eightieth inch in diameter, while the National Association of Lime Manufacturers at first proposed as a standard a material of fineness of one-tenth inch in diameter, and Doctor Hopkins, of the Illinois Station, has very strongly advised the use, in large amounts, of rather coarse crushed limestone. This advice appears to be based upon the idea that the fine material of the limestone would be immediately available, and the coarser material would later come into use with sufficient rapidity to make the investment in such coarse limestone particles an economical one. This department has made siftings of rather coarse crushed stone, and finds that not more than one-third is, as a rule, fine enough to pass a sixty-mesh sieve, and sometimes very much less than this fraction is of such fineness. Since the freight and hauling costs constitute such an important element of the cost, it seemed wise to make a careful study of the efficiency of the limestone as related to its degree of fineness. Accordingly, in 1912-13, the department made an experiment of this kind, the experiment being planned along lines proposed by Doctor William Frear, and conducted by Walter Thomas, B.S., Assistant Chemist. The stone employed was the Trenton limestone obtained from the Bellefonte quarries. This was very carefully sifted to different degrees of fineness, each grade being washed, so that the adherent dust was removed. The soil used for the experiments was a portion taken from Plat 32 of the General Fertilizer Series, which had become intensely acid, as a result of the continued use of ammonium sulphate fertilizer for thirty years. The experiment was made in pots, under carefully conducted conditions. The results are briefly stated as follows, in terms of the yields of the dry clover:

	Weight of Dry Clover (Grams).
Receiving no limestone,	
Receiving limestone, 1-20 to 1-40 in.,58
Receiving limestone, 1-40 to 1-60 in.,	2.87
Receiving limestone, 1-60 to 1-80 in.,	3.79
Receiving limestone, 1-80 to 1-100 in.,	4.60
Limestone less than 1-100 in.,	4.86

This experiment is, of course, not conclusive for the more porous limestones, but for compact stone, such as was here employed, it seems safe to conclude that a material coarser than one-fortieth inch has comparatively little value, and that the cost of reducing to one-sixtieth inch in fineness is quite sufficiently compensated by crop increase, and that with the further increase in fineness there is distinct gain in effect; but it is not so clear that the increases are sufficient to warrant the additional cost of pulverization. Unfortunately, distinct data as to these additional costs are not in hand, so that no close conclusions upon that point can be made. These data, added to the observations made, particularly in France, where the relations of the fineness of limestone in the soil to the production of chlorosis in the grape, have been extensively studied, indicate that we can expect no large return from coarse limestone particles within

any very brief time, particularly if the limestone particles are compact. They also indicate that, at ruling prices, it would be more safely economical to purchase for purposes of soil neutralization, only such stone as shall have been ground to a fineness of one-sixtieth inch.

Tobacco Experiments.—Experiments under the auspices above indicated, have been in progress for about twenty years, chiefly in Lancaster County; although for several years, the existence of a tobacco growers' organization in Bradford County made some co-operative work in that county possible. During these earlier years, two questions proposed by the Lancaster County tobacco growers' association, were made the principal subjects of study, namely, the adaptation of commercial fertilizers to tobacco growing, and the possibilities and cost of production of shade-grown Sumatra type wrapper tobacco. These very carefully checked experiments led to valuable results, but owing to space limitations, these results will not be here detailed. Under present conditions of tobacco culture in Lancaster County, these facts appear:

1. That the seed leaf or broadleaf variety is well established and largely preferred because of its yields.
2. Its use is almost entirely for making cigar fillers, since the coarseness of the leaf and leaf veins is too great to make the average product valuable for either binder or wrapper purposes.
3. That there is an established market for this product, because of the excellence of the burn and the mildness of the flavor and aroma characteristic of the tobacco grown in Lancaster County.
4. That under present conditions of tobacco selling, there is prospect of greater gain to the grower from increase in crop quantity than from modification in crop quality.

5. A study of the costs of production was made on a number of farms, and it indicated quite clearly that the farmers who were making the greatest profit per acre were those who, while giving good attention to other points, were laying particular stress upon the care and the selection of the seed used. The station, therefore, undertook a line of experiments, having in view the improvement of crop yield by seed selection. The purpose was, by careful observation in the field, to discover such strains as exhibited superiority in vigor and growth; resistance to disease; uprightness of habit; satisfactoriness of leaf form and excellence of curing quality. Observations were made upon seventeen carefully selected farms. As a result, upward of twenty strains were selected for comparison under like conditions of growth. The selection was necessarily made before topping, so that the possibility of cross-fertilization should be excluded. For several years past, the seed from these selected plants, and from their carefully selected offspring, kept pure as above indicated, have been grown under like conditions of fertilizer treatment, cultivation, topping and curing. The result has been the discovery of two or three strains which have, on the lands upon which the tests have been made, given yields of from 300 to 800 pounds per acre more than some others of the selected strains; and have retained their excellence of leaf form, resistance to disease and drought, erectness of habit, uniformity of leaf upon

the stalk, and curing quality. Two of these may be mentioned: the strains known as the Slaughter and Hostetter strains of the broadleaf variety. Numerous other strains have been dropped from the test, because they have shown one or more defects, such as diminution of vigor, leading to diminished yield; susceptibility to rust and calico; low resistance to drought; development of undesirable leaf form; too close setting of the leaves upon the stalk, so that exposure to the sun was too greatly reduced; too small number of leaves per stalk; and, particularly in one case, great liability to pole burn during curing was observed. The station has distributed many parcels of cured seed of these varieties sufficient for introduction to the farms of Lancaster and adjacent counties.

Certain differences of crop yield were shown by the same variety when grown upon two different soils under exactly the same conditions of growth, and experiments are now in progress to ascertain whether or not these varieties are widely adaptable to the various soil types upon which tobacco is now grown in Lancaster County. If they so prove, it would appear that, by the adoption and maintenance in good type of these strains, the acre yield of tobacco could be improved by one-seventh or one-eighth of the present average, certainly a very material gain without additional cost to the producer, except the extra precautions to keep his seed pure, and to use only heavier and more vigorous seeds in his seed-bed.

Correlated with these experiments are other experiments now in progress in Clinton County, to ascertain the adaptation of river bottom lands to filler, wrapper, and binder tobaccos; and also upon the shaley lands of York County, to find the cause of and to remedy the deficient burn in that section. Numerous other investigations have been made upon the influence of time of topping upon the leaf spacing upon the tobacco stalk; influence of suckering upon the cost and yield; relative cost of priming and stalk harvesting, etc.

Department of Experimental Pomology.

This department is engaged exclusively in investigations of the principal problems connected with the production of tree fruits. In particular, it is endeavoring to find out for Pennsylvania just what methods of fertilization, soil management, spraying, etc., will generally give best results in both quantity and quality of product; and also what varieties, cover-crops, and methods of propagation are generally best. The experiments of the department are located in the leading fruit sections of the State, and in a thirty-three acre orchard planted at the college in 1908. Altogether, ten soil types and more than 3,600 trees are definitely under experiment, and they have produced over 40,000 bushels of fruit since the work was started. These experiments have attracted wide attention, and have been visited by a number of the leading horticulturists of both Europe and America, as well as by many orchardists of the State.

As to practical results, we may mention the development of a satisfactory, general formula for the fertilization of an apple orchard, and a plan for local adjustment of the formula to the exact conditions involved. This general formula calls for about thirty

pounds of actual nitrogen, fifty pounds of actual phosphoric acid (P_2O_5), and from 25 to 50 pounds of nitrogen (K_2O), the quantity of the latter depending on the apparent need for it. The nitrogen is probably best carried in a combination of 100 pounds of nitrate of soda and 150 pounds of dried blood. The carriers for the other materials are apparently less important; any standard carriers may be used. The above amounts are advised for an acre of bearing trees; for younger trees they may be reduced approximately in proportion to the reduction in area of soil covered. The best time of application is probably after the fruit is set, but not later than the first of July. In all cases a few typical trees should be left without fertilization in order to determine whether the application is of service. This general fertilizer is now proving remarkably beneficial in the orchards of a number of growers, especially in the western part of the State, and similar applications in our experiments have resulted in gains ranging from 50 to 370 bushels per acre, annually, during the past five or six years.

This department has developed the method of preparing and diluting the concentrated lime-sulphur spray, which is now considered the standard over nearly the entire country. It has also devised a new type of lime-sulphur strainer and other equipment designed to reduce the labor and difficulties formerly connected with spraying operations.

The experiments of the department are also developing the fact that in the early stages of the average apple orchard the conservation of moisture is generally more important than plant food. They are also showing that this conservation is best accomplished by means of definite vegetative mulches. Where such mulches are not available, however, the next best method is tillage. Cover-crops in orchards have not yet proved as valuable as might be expected from theoretical considerations. As apple trees grow older, however, the cover crops seem to become more valuable, and the same is true of fertilization.

Department of Horticulture.

The experimental work of the Department of Horticulture is being confined chiefly to truck crops—cabbage, tomatoes, and asparagus. During the past five years, extensive strain tests with the leading varieties of cabbage (Plate 4, Fig. 1) and tomatoes, have been conducted. These tests have shown that important variations exist among strains of many well-known varieties, and that in some instances these variations represent a money value of more than one hundred dollars per acre in the case of cabbage, and an amount nearly equal to that sum in the case of tomatoes. Bulletins giving the results of experiments with each crop have been published. The strain-test experiment showed the importance of variations within varieties, and it has since led to the institution of breeding experiments for the purpose of determining fundamental principles involved in the production of high-grade seed as well as the development of improved varieties of cabbage and tomatoes. This work is not sufficiently advanced to permit specific statements concerning it,

but the data thus far secured promise to be of scientific as well as economic value. The work with asparagus has been in the direction of a variety test which was established in 1908. The test has included Bonvalet Giant, Conover Colossal, Barr Mammoth, Columbian Mammoth, Dreer Eclipse, and Palmetto. The financial returns from the crop of these several varieties have varied from four hundred and thirty-nine dollars per acre, as in the case of Columbian Mammoth, to six hundred and seventeen dollars per acre received for Palmetto.

Another interesting experiment with asparagus was established for the purpose of determining the value of grading the crowns when transplanted. The crowns were graded into three sizes, and from the beginning the differences have been quite pronounced. The records of harvesting for the past season show that there was a difference of \$155.00 per acre in gross receipts from the small and large size crowns. The rule to be applied is that, if one desires to establish an asparagus plantation, he should secure about three times as many crowns as will be needed and then use only the best. Some experiments are being conducted for the purpose of developing disease resistant strains of asparagus, but they are not sufficiently advanced to justify recommendations at this time.

For student practicum work in vegetable growing see Plate 4, Fig. 2.

BUSINESS SESSION.

The regular annual business session of the Association convened in the Court House at 7:30 P. M., Wednesday, January 21, 1914. President Creasy in the chair.

The Chair having ruled that nominations for officers be made from the floor, the following were nominated.

President: C. J. Tyson and E. A. Weimer. (3) Vice-Presidents: Dr. I. H. Mayer, F. H. Fassett, W. J. Lewis. Secretary: J. A. Runk. Treasurer: Edwin W. Thomas.

There being only the required number of nominees for Vice-Presidents, Secretary and Treasurer, the Secretary was instructed to cast the ballot for the above named officers and they were declared elected.

There being two nominees for President, the Association proceeded to ballot, the result being, C. J. Tyson, 132; E. A. Weimer, 38. Mr. Tyson was declared elected for the ensuing year.

Two proposed amendments to the constitution had been duly presented in writing, included in the notice of meeting and considered by the Executive Board. The Board gave them both favorable consideration and voted to refer them to the meeting for decision. Both amendments were fully considered and discussed and both finally carried as follows:

Amendment to Article II, making the Annual Dues two dollars (\$2.00) and the Life Membership, twenty dollars (\$20.00).

Amendment to Article VI, adding the following:

"The regular meetings of the Association shall be closed to all



FIG. 1. Strain tests of early cabbage conducted by Department of Horticulture of The Pennsylvania State College.



FIG. 2. Intercropping of vegetables in student gardens at The Pennsylvania State College.
PLATE 4.

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PLATE 4.

persons, except paid up members, speakers, delegates from associations outside of Pennsylvania, all ladies and the minor sons of members."

Certificate was received for Walter Scott, of Cranbury, N. J., as a delegate of the New Jersey State Association. His presence was most acceptable.

After discussing the financial condition of the Association the session adjourned.

COVER CROPS FOR THE ORCHARD.

F. H. FASSETT, *Meshoppen, Pa.*

The subject assigned me, "Cover Crops for the Orchard," is a very important one. Naturally, the first question that suggests itself is tillage plus cover crops, vs. the mulch system. Without entering into a discussion of the two systems, I want to say that from my observations all over the State, and from my own experience, I believe the tillage and cover crop system is the best, especially for the bearing orchards.

In considering the question of a cover crop, the first thing to determine is what do we expect to accomplish with them. My observations of the orchard conditions lead me to believe that in most orchards nitrogen is the crop limiter, and the experiments of Dr. Stewart clinches this belief, as in every case when nitrogen was applied, whether in the form of commercial fertilizer or barnyard manure, some wonderful results were obtained.

Then the question naturally arises, what is the best means to obtain this element? To my mind it points strongly to the use of a leguminous cover crop. If we can obtain the nitrogen by the use of these cover crops, it looks to me as though this was the cheapest source, and when we get the nitrogen in this form I believe it is the best possible form for the use of our trees.

The question of what shall we use for a cover crop, we realize that there are so many different soils and so many different climatic conditions that it would be impossible to name any one crop that would be the best for all parts of the State. We have a number that are good. Among the best are hairy or winter vetch, crimson clover, soy beans, cow peas and the common red clovers. Some of them may be used in a combination. Vetch and mammoth red clover makes a good combination, eight pounds of red clover, twenty pounds vetch to the acre. Rye and vetch make another good combination, twenty to twenty-five pounds of vetch and one-half to three-fourth bushels of rye. I especially recommend the last in orchards where vetch has not been grown.

Cover crops have not been given a fair show. Too many times most orchards are so depleted in fertility that they are unable to grow a crop that amounts to anything. It ought not to be called a cover crop until we get our orchards in such a condition that we can grow at least one ton or more to the acre, then we will be able to see the benefit of the cover crop system.

There are some reasons why we prefer the vetch. A pound of dry material contains more nitrogen than any of our legumes. The seed will germinate and grow in soil when it is so dry that none of the others will germinate. It takes less moisture than any other. The only thing against it seems to be the cost of the seed, and yet we believe it pays to use it.

There is another question that the cover crop helps us to solve, and to my mind, that is the greatest question that confronts us to-day. That is the control of soil moisture, and it is not only a big question for orchards, but to my mind it is the vital question that confronts every tiller of the soil in our state. This question arises, how best can we control this great element—the loss of soil moisture. Largely because we have farmed out of our soil all the vegetable matter, or humus, which must be returned to enable our soil to hold the moisture. The question arises, how can we best restore this vegetable matter to our soil? We believe the cover crop offers to us the cheapest solution of the problem. Not only can we obtain our nitrogen the cheapest and in the best form, but by plowing it down in the soil we give to that soil the power to consume or hold the moisture, and when we can grow a good heavy cover crop, we will, to my mind solve two of the hard problems that confront the orchardist, that of nitrogen and conservation of the moisture.

Each orchardist will have to study well his conditions, and his soil, as well as climatic conditions, and select the cover crop best suited for his needs, but don't condemn the system until you have your orchard in such a condition that you can grow a good heavy crop.

There are some other uses for a cover crop. We sometimes use them to check growth in the young orchard. Such conditions do not usually exist outside of the real peach belt, but on some of the more fertile soils of southeastern Pennsylvania, often trees grow too rapidly and go into winter with the wood too soft, and are apt to winter kill.

For the purpose of checking growth, oats makes an excellent crop; sow about three bushels per acre about the first to the middle of August. They will demand from the soil the plant food and the moisture, because they are a rank grower, and the tendency will be to check the growth and allow the wood to ripen up and go into winter in good shape.

I want to indorse what has been said by Mr. Griest, of Adams County, and Mr. Hershey, of Harrisburg, in regard to the use of the leguminous cover crops in the peach orchard.

In conclusion, I want to say, give the cover crops a good show and I am sure you will become as firm a believer in them as I am.

Discussion.

Question.—How about sweet clover as a cover crop?

Mr. Fassett.—I do not know of much experience with it in Pennsylvania.

Dr. Mayer.—What is the cost of hairy vetch?

Mr. Fassett.—I sow about 30 lbs. to the acre and it costs around 10 cents per lb., a little more expensive than some other covers but then it is a sure crop.

Question.—When do you sow hairy vetch?

Mr. Fassett.—I sow it in July or August but it can be sown much later. In fact one of the strong points in its favor is the fact that it can be sown later than almost any other cover crop except rye.

Mr. Creasy.—Do you think crimson clover could be made hardy in the north by saving seed there year after year?

Mr. Fassett.—It is entirely possible that it might.

Mr. D. M. Minnick.—We have an orchard in Lycoming County and have had some very good results with crimson clover and orchard grass sown together, especially on hilly ground that is inclined to wash.

Question.—Is it really possible to get a good stand of crimson clover in a heavy, first-class crop of corn? We have tried it and have about decided that it is better to grow one thing at a time.

Mr. Fassett.—In our section we can get a good stand of clover in the corn that is planted at the regular distance for grain. In thickly planted ensilage corn we cannot always do it.

Mr. D. A. Knupperburg.—In breaking up an old orchard which has lain in sod many years, how deep would you plow?

Mr. Fassett.—I would break it up first with a disk and work it thoroughly that way the first season. After that you can plow safely but I should not go over four inches deep.

Mr. J. C. Willson.—In some parts of the State, growers are sowing buckwheat as a cover, simply to loosen up the soil.

Mr. Fassett.—Buckwheat does very well if it is plowed down in time but I do not like to have any grain ripening in the orchard. I feel very sure it is harmful.

COLD STORAGE—A VITAL AID TO THE APPLE INDUSTRY.

MR. D. N. MINICK, *Chambersburg.*

In looking through your program, I am led to believe that your principal object for holding this, your Fifty-fifth Annual Convention and Fruit Show of the State Horticultural Association, is to discuss the best methods for growing and caring for fruits.

"Cold Storage, A Vital Aid to the Apple Industry," is the subject assigned to me.

I doubt not that some of the thoughts that it suggests to me have been expressed to you before. Some points, however, may well bear repetition. I have been assured that the subject is a broad one, by the fact that you have placed it on your program. I am also certain, from personal experience as a grower and dealer, that the vital aid of the cold storage in handling the apple crop is of such great importance to the extent, that if it should be restricted or done away with, the loss of the Producer would be immeasurable, and the thought and work of your association in the past fifty years would partly come to naught. And before I finish, I shall state my views on some matters that, in my judgment, are of consequence.

If I should overstep the line of propriety and in any way offend any of you, I shall be sorry for it. If, on the other hand, I should be able to say anything which may result in benefiting you, I shall feel well pleased.

The creators of this association must have possessed good character, if I understand their object in forming this organization.

The efforts to work together in bringing about the best results in the production of foodstuffs from the earth in order to supply man and beast with plenty, at a reasonable cost and for a reasonable profit, is what I think your organization stands for. At least, I am of the opinion that this was the principal object of the creators of this organization.

I am sorry to state that in my way of thinking, I am led to believe that there is misrepresentation, exaggeration, dishonesty, and envy practiced by members of this association as well as by members of other associations of this kind.

By misrepresentation I mean creating such an impression that the general public is led to believe that the apple industry is as profitable as the Standard Oil Company.

I often wonder, after hearing some men relate the immense profits derived in the fruit growing business, that there is any money left in circulation to manipulate any other kind of business.

Exaggeration is the principal cause for the cry of the high cost of living. This leads to the election of inexperienced men to office who are introducing bills to interfere with your business.

On November 12th and 29th and December 6th respectively, Hon. K. D. McKellar, of Memphis, Tenn., introduced in the House of Representative, bills H. R. 9266, H. R. 9530, and H. R. 9987,

prohibiting the storing of perishable foodstuffs for a longer period than 90 days.

And if enacted into laws, will limit the cold storing of all perishable foodstuffs to 90 days. These bills also provide an injustice in the way of an extra expense in the marking and selling of same; which will have to be paid for by both the producer and consumer.

Apples have become a staple food. The consumer demands them from the time they are produced until the time they are reproduced and this demand can only be supplied by the protection of cold storage.

If you will acquaint yourselves with the market reports from large cities, you will readily see that apples taken out of cold storage from Dec. 15th until the crop is consumed, command from 50 cents to \$1.00 a barrel more than apples kept in common storage.

I am positively certain that the reason for this is caused by the consumer being perfectly willing to pay the difference in price on account of the difference in the condition between the common and cold storage fruit.

If Bills H. R. 9266 and 9530 be enacted into laws, it will totally ruin the apple industry, and will bankrupt many of us producers who have large sums invested in the growing of orchards. There would also be famine in the winter and such an over-supply the rest of the time that the producer would get nothing. Apples need no restriction. They speak for themselves. They have to be moved within a limited time from their very nature. There never has been, and never will and can be, any combination to fix or control their price. Competition is keen and universal.

Cold storage is absolutely essential and without the vital aid in the handling of the apple crop, the producer on one hand would become bankrupt and their investment ruined, and the consumer on the other hand would be without any fruit a large part of the year.

Discussion.

H. C. Brinton.—Where do you consider it best to build the cold storage, in the city where the fruit is marketed or in the country where it is grown?

Mr. Minnick.—Both are needed and there are arguments for both. The storage house is needed in the city so that fruit may be gotten out and put on the market quickly and the fluctuating demands taken care of, even when the weather might be too severe to draw from the house in the country. On the other hand there are decided advantages in favor of the country storage houses. The chief of these is the great importance of getting apples cooled at the earliest possible moment after picking. We have found this to make a very decided difference in the keeping of apples of the same variety.

Refrigeration keeps the fruit by preventing ripening and if the apples are allowed to stand around in freight cars until ripening

begins, they cannot be expected to keep after they are put into cold storage.

Dr. Mayer.—How does the cost of storing three boxes compare with the cost of storing one barrel?

Mr. Minnick.—It costs a little more. We have not made much difference in charge in our house at Biglerville but it does cost a little more on account of handling three packages instead of one and then the boxes have to be stripped.

Question.—Which is the best system of cold storage?

Mr. Minnick.—I can hardly say. We have the Ammonia system and it works perfectly. There are hundreds of them in the country.

M. G. Kains, New York.—A remark was made yesterday concerning the gravity brine system of cold storage. At the time I did not comment on this as I presumed that it would be brought up when Mr. Minnick spoke to-day. As the point has now been raised, I may say that while I have not had personal experience with this system I know of several cold storage houses run on this plan. It is a less expensive system to install than either the carbon-dioxide or the ammonia systems because no engine or refrigerating machinery is needed. It is also less expensive to operate because a skilled engineer is not needed to run the machinery. The principle on which it operates is the reverse of a hot water system because the circulation of the cold water is downward through coils of pipe in the rooms to be chilled whereas in the hot water system the circulation of the heated water is upward in the rooms to be warmed.

The advantages of the gravity brine system which is controlled by Madison Cooper Company, of Calcium, N. Y., are: First, that cheap labor may be used to keep the plant running, and natural ice from ponds or streams will supply all the cold needed. The ice is stored in an ordinary ice house, preferably in the storage building so it can be kept below the freezing point by the coils of pipe which circulate brine at a lower temperature than the ice itself. There is thus no melting or loss of ice. This lower temperature is secured just as a lower temperature than ice is secured in an ice cream freezer; namely, by a mixture of broken ice and salt packed around coils of brine-filled pipe in a tank at the top of the building. Herein, however, lie three of the chief disadvantages of the system. First, there must be a nearby source of natural ice which can be cut and stored at small cost; second, a large amount of space must be occupied by the stored ice to carry produce through the storage season. This space could be more profitably utilized in either of the chemical systems which would admit of its being used for the storage of produce. Third, a large amount of labor is needed to break the ice and mix it with salt to maintain the freezing temperature. While the gravity brine system

can be and is used successfully for storing produce, it is a question in my mind whether it would prove as economical in the operation of large plants such as Mr. Minnick's at Biglerville or of larger plants than this. I know of no available and unbiased data on this point.

Mr. Clark Allis, of Medina, N. Y., installed one of the Cooper systems in a fruit storage warehouse on his farm. It was built specially for him. I visited this warehouse during construction, and have written about it in *American Agriculturist*, of August, 1912. It kept apples perfectly and so far as the storage is concerned, it gave satisfaction. However, Mr. Allis told me only a few weeks ago that he does not like the amount of labor involved in operating and is therefore seriously contemplating a change from the gravity brine system to one of the chemical systems mainly, I believe, because of the labor involved in the former system.

While I am on my feet I may call your attention to the display of small refrigerating machinery in the exhibition hall. I do not know anything about these particular machines; but I know of one small machine which was, I am sure, smaller than the one shown in the hall. It is in a drug store at Springfield, Mass. The druggist has found it to be more economical in keeping his ice cream and his soda water cold than was the old ice system for the same purpose.

Unquestionably fruit growers should have some system of cold storage even if nothing more than natural storage chilled by opening windows and doors at night and keeping them closed during the day, the way Mr. Lewis manages his; but whether it will pay an individual fruit grower to put in a gravity brine or a chemical storage will depend almost wholly upon the amount of fruit or produce he has to dispose of and the markets he plans to reach.

SOME POINTS ON THE GENERAL CARE OF APPLE ORCHARDS.

By DR. J. P. STEWART, *Experimental Pomologist, State College, Pa.*

In the present discussion we shall make no attempt at a logical treatment of the subject of orchard care, but will merely call attention to a few points which are either left untreated in most discussions or may require additional emphasis.

Securing Earlier Bearing.

The securing of early fruiting is one of the most important matters connected with orcharding. Most of the advice of the past has tended to delay fruiting rather than hasten it. This is because too much cutting was generally advised in the pruning and training of the tree, thus making the tree produce wood repeatedly over the same general spaces without making anything like a normal advance for each season's growth. On the basis of the best experiments now available it appears that the earliest fruiting for any variety is obtainable primarily by securing the

largest growth and by leaving this growth alone so far as is consistent with the securing of a satisfactory tree.

The way to secure the largest growth in young trees on the average orchard soil is chiefly by conserving the moisture. We have found that the rate of growth of the trees in our young experimental orchards corresponds very closely to the relative amount of moisture conserved by the different cultural methods. Also, the best method of conserving moisture is by means of a satisfactory mulch of some kind of vegetation, especially of strawy stable manure. Probably the best treatment that can be applied for hastening growth in a young tree is to keep it well mulched with the latter material. If a mulch is used, however, it is essential that some definite provision be made against mice. Galvanized wire screens 18 x 18 inches, made of No. 20 wire and 3 meshes to the inch, are very effective for this, and they will last, without change, for 12 or 15 years. They will cost about 7 cents apiece. Certain coatings such as a thorough application of dense lime-sulphur, more or less mixed with sediment, will also prevent both mice and borers, if kept renewed sufficiently often.

The way to do the least possible amount of pruning and still have a good tree is to remove the superfluous limbs before they have made any appreciable growth. This is best accomplished by doing the necessary pruning and training in the early part of each season or as soon as possible after growth starts. This is especially important for the first two or three seasons. In fact, the entire frame-work and general habit of the tree should be definitely established in practically any variety by the middle of the third season at the latest. Five limbs is the maximum that should be allowed on any tree for frame work and each of these limbs should be permitted to develop only two limbs and they in turn should produce not over two. This can be accomplished in the early part of the third season, and after that the tree should be left largely alone until it begins bearing, at which time some additional pruning may be done if this seems necessary.

Comparatively little heading back should be done, and that which is done should be for the purpose of keeping the top balanced up properly and not permitting any of the limbs to greatly outgrow the others. Also in some few varieties which tend to develop exceptionally long annual growths with comparatively few lateral branches it may be necessary to head them back occasionally to prevent too tall and rangy growth.

This system is likely to develop a tree that looks rather dense and frequently "bushy" from the ordinary horticultural viewpoint, but both experience and experiments have indicated that it is the way to secure both the largest growth and the quickest fruiting of any system that can be followed. One need not become alarmed even if some of the varieties seem to be growing too dense and too erect in the tops, as in the majority of cases these same trees will spread out naturally and develop very satisfactory tops as soon as the bearing habit becomes well established. I have seen young Baldwins especially, which seemed to be growing much too erect and dense in the tops and from their appearance it was very

natural to advise that they be pruned rather excessively to open out the tops and secure more spreading growth. A comparison, however, with larger trees of the same variety right alongside, which had been handled similarly, showed that such a treatment was not likely to be necessary because the older trees had already developed excellent and typical Baldwin tops. Incidentally it may be well to call attention to the fact that in pruning to open up the top of a tree it is much more effective to prune to outside limbs rather than to outside buds for reasons which should be obvious.

The Control of Aphids and Red Bugs.

These are two very different kinds of insects that have recently been causing considerable damage in this State and their control, as well as the nature of their injuries, should be more generally understood. There are five species of aphids, which attack the apple and two species of red bugs. Of the aphids, one of the most important is the woolly apple aphis since it attacks both the top and roots of the tree and it remains on the latter throughout the year, producing considerable enlargements on the roots and eventually causing the decay and death of the roots affected unless their action is checked.

A new fact of importance in the control of this insect has recently been discovered by Miss Patch of Maine, who is one of the leading authorities on aphids at the present time. This is that the elm, particularly the American Elm (*Ulmus Americana*), is the over-wintering host for the sexual forms, eggs, and the first two or three broods of this species of aphid and, strictly speaking, the apple is therefore merely the summer host of this aphid with the exception that some of the non-sexual or agamic forms remain over the winter on the roots, as just indicated. In view of this fact it is evident that no American Elms should be permitted to grow in close proximity to a commercial apple orchard, and also the production of both apple and American Elm trees in a single nursery is decidedly bad practice.

As a general proposition, it is inadvisable to plant any apple trees that show signs of material injury from the woolly aphis on their roots. If this aphid, however, is found to be attacking the roots of trees already established, some method of control is necessary. A great many measures have been tried for it, chief among which may be mentioned the use of tobacco stems or tobacco dust around the bases of the trees. This method and nearly all of the others commonly advised have been found to be practically worthless so far as definitely reducing the aphids is concerned. One method, however, has proved successful, and it involves considerable work. Since it is only the younger or smaller trees that are especially injured by the aphis, however, the method is usually practicable. It involves the removal of the soil around the trees to expose the principally infested roots for a distance of two to four feet from the base of the tree. This area is then saturated with kerosene emulsion diluted to contain about 10 per cent. kerosene and the soil is immediately replaced, as the fumes are thus re-

tained and they act as a strong repellent to later attacks of the aphids. This method was found by R. I. Smith, in Georgia, to be quite effective in killing practically all of the aphids with which the material came in contact and in preventing additional attacks. The best and safest time for making the application is during the active growing season and not later than the first of July.

The aerial forms of this aphid, and also any other of the aphids which attack the upper portions of apple trees, may be readily controlled either with a kerosene emulsion or perhaps better with a tobacco extract or nicotine solution diluted so as to contain about .05 of 1 per cent. of nicotine sulphate in the spray as applied. The strongest of the nicotine preparations offered on the market is apparently the "Black Leaf 40" put out by the Kentucky Tobacco Products Company, at Louisville. This material contains 40 per cent. of nicotine sulphate and its rate of dilution is readily obtained by dividing the 40, which indicates the per cent. of nicotine sulphate in the concentrate, by the ".05 of 1 per cent." desired in the final spray. This gives a quotient of 800, which means that the Black Leaf 40 can be diluted 1 to 800, or at the rate of about 1 pint to 100 gallons of spray material, in the control of aerial forms of aphids. The rate of dilution of any of the other trade preparations can be readily determined in the same way when the per cent. of nicotine sulphate, which they contain, is known.

If the tobacco extract is being applied for the aphids alone, it is desirable to add about 2 pounds of soap to the 100 gallons of spray to increase its spreading and wetting qualities. If, however, the tobacco extract is being added to one of the regular sprays involving lime sulphur, which can readily be done without injury to either material, the soap is not needed and it is likely to be objectionable in case any arsenical is also present.

The proper time to spray for most species of aphids is just as the buds are stating, since practically all the species hatch just slightly before the green tips begin to appear in the buds and they crowd at once to these tips and begin feeding on them. This is the ideal time to kill the aphids, and if the regular application for San Jose scale can be safely deferred until this time, both operations can be done very effectively with a single application by merely adding the tobacco extract to the scale preparation. If, however, this is inadvisable, it may still be possible to control the aphids quite effectively by deferring the aphid application until about the time of the first application for apple scab, bud moth, etc., which is usually made just as the pink is showing in the tips of the blossom buds.

The Red Bugs.—These insects are comparatively new among the apple pests, the original work upon them being done by C. R. Crosby, of Cornell University. They are true bugs, which means that they feed with a beak instead of jaws, and in the adult stage they have wings which are membranous only at the tips in the case of the upper pair. They become about one-fourth of an inch long in the adult stage, and in the young nymphal stages they range from 1.2 to 4.3 millimeters in length. As already indicated, there are two species affecting the apple, one of which is called the red

bug and the other the false red bug, although the latter is the redder of the two.

The nymphs of both species are a brilliant tomato-red at first, with a few dusky markings. The latter become more prominent with increasing maturity, especially about the thorax and head in the case of the red bug. This insect in its adult stage may become nearly black over the forepart of its body, while its dorsal surface is covered with white scalelike hairs. The false red bug lacks these hairs and its beak is light colored or translucent, with a dusky tip.

The eggs of both species are laid in twigs, preferably in two-year-old wood, late in June or early in July. Those of the red bug are inserted in slits made in the bases of fruit spurs; those of the other bug are inserted in pairs in the lenticels. The former begin hatching soon after the fruit buds open and are through when the blossoms open. The latter hatch about a week later.

The young nymphs are rather shy, but are very active. The first indication of their presence is likely to be the clusters of minute reddish dots on the young leaves, caused by the punctures of their needle-like beaks. Their presence may be determined earlier by placing branches of bearing wood in water any time after March 1st, to force out the buds. If present the brilliant-red nymphs should appear soon after the leaves.

As soon as the fruit is set they begin feeding on it. The fruit punctured most severely usually drops; that remaining on the tree may mature, but it becomes dwarfed, knotty and practically worthless. See Plate 10, Fig. 1. I have found a reduction of more than sixty-one per cent. in the size of infested apples.

The habits of the bugs, together with experiments and commercial practice in New York, indicate that the best times to spray for these insects are: 1. Between the opening of the buds and petals for the red bug. 2. Immediately after petals fall for the false red bug and for stragglers from the earlier species. Nicotine solutions at the strengths indicated above for the aerial forms of the aphids should be used. In the second spray these solutions should be added to the more diluted forms of lime-sulphur, and if scale is not involved this form is probably best for both sprays. The usual lead arsenate for the apple worm can be added in the second spray without reduction in efficiency.

Notes on the Fruit Pit Disease, or "Stippen."

This is a disease which appears in a number of varieties, causing the pithy or punky spots frequently observed in the flesh of the varieties affected. This is called the Fruit Pit disease in most of the American literature, and it is referred to as Stippen by the Germans. The latter name would really be preferable in American literature to avoid confusion with certain other diseases commonly referred to under the name of Fruit Spot. So far as we know it is a physiological disease. It is supposed to be increased by conditions which favor excessive transpiration during the day, followed by a sudden checking at night with a continuation of vigorous absorption of moisture by the roots as a result of

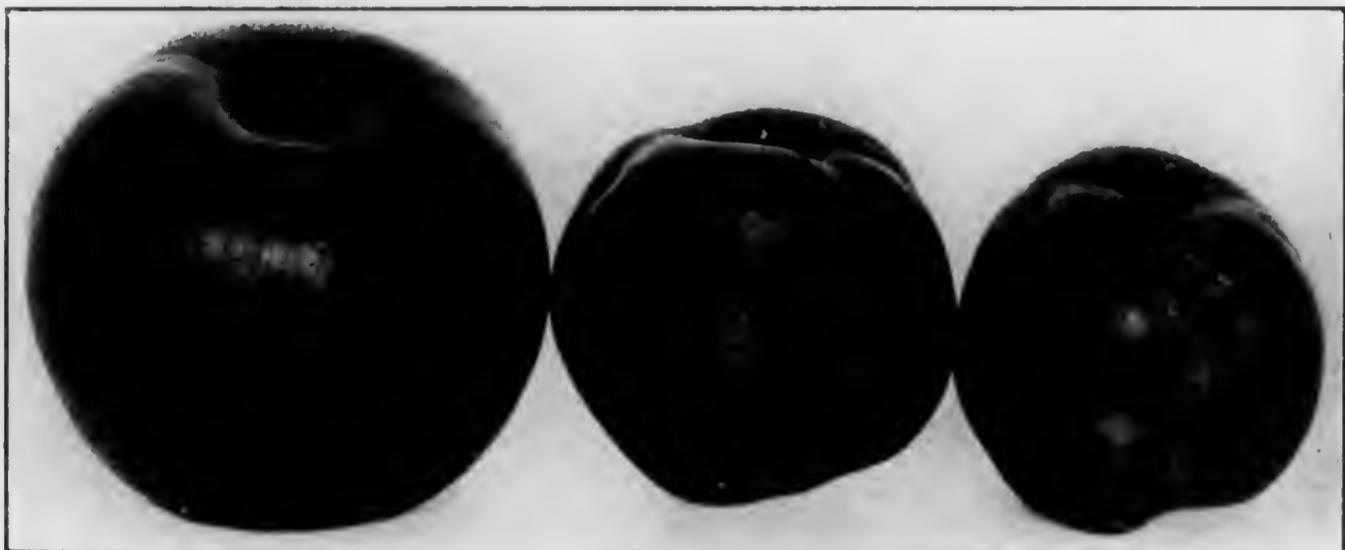


FIG. 1. Grimes (Golden) apples injured by apple red bugs. Those on the right show the injury which has reduced their size by more than 60 per cent. and has produced their general knottiness.

PLATE 10.

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the warm soil and abundant moisture. Incidentally we might call attention to the fact that these are also the conditions which are supposed to favor the development of water core in apples. Also, we have received a recent report that a man in Australia, McAlpine by name, who has given a great amount of attention to this disease and has published very extensively on it, has recently discovered the real cause and he is supposed to be writing up his discoveries at the present time. For fear, however, that his cause will be beyond the control of the average orchardist when we do obtain his report, I wish to call attention to one or two methods of influencing this disease which are within control.

The first of these suggestions is to control the disease by avoiding susceptible varieties. This can be done only by having satisfactory lists of the leading varieties, in which their relation to this disease is made clear. For this reason I am submitting a provisional list of our more important varieties showing those which are very susceptible, those moderately affected, those affected only superficially, and those usually immune or practically so. This list is intended merely as a guide until we have fuller information and more observations on the behavior of the different varieties. It is also quite likely that there will be some shifting of varieties from some of the classes into others. As a general proposition, however, we believe that the present list comes fairly close to the actual behavior of the varieties indicated in their relation to the Fruit Pit or Stippen disease.

Provisional List of Varieties in Their Relation to Fruit Pit.

(A) *Very Susceptible.* Baldwin, Sutton, and Pennock. (In some situations also the Gano and York Imperial are very severely affected with essentially this same disease though in a somewhat different type in which the spots are much larger and more irregular in shape.)

(B) *Intermediate. Varieties Moderately Affected.* Hubbardston, Yellow Newtown, Albemarle, Gravenstein, Rhode Island Greening, Newtown, Spitzenburg, Porter, Winter Banana, and Delicious. (The York Stripe and Stark, named in Section D, may also belong in this class.)

(C) *Varieties Affected Superficially.* Jonathan and Northern Spy.

(D) *Varieties Immune, or Practically so.* Yellow Transparent, Early Ripe, Williams Red, Maiden Blush, Summer Rambo, and practically all varieties maturing before the Gravenstein. Also the McIntosh, Wealthy, Smokehouse (?), Grimes, York Stripe (?), Stayman Winesap, Rome Beauty, Stark (?), Paragon, and Black Twig, or Arkansas.

With this list, and the corrections and additions that may be made from time to time, it should be possible for one to practically avoid the stippen disease by omitting the varieties or localities that are especially susceptible or conducive to it. In an orchard already established, however, and containing varieties especially subject to the disease it is probable that the chief way to

reduce it is to avoid those conditions which tend to develop abnormal size. This suggestion is based on the fact that our fertilizer experiments show that practically the only influences which seem to materially increase the disease are those which also tended to produce unusual or abnormal size in the fruit. This is particularly true of manure, when the number of fruits on the tree is rather small. It is hoped that further suggestions looking toward the control or elimination of this disease may be possible in the near future, as I consider it one of the most serious difficulties now affecting the apple business.

(A demonstration of different styles of wrapping apples was also given, in which the merits and defects of some of the common methods were brought out. The method considered best by the speaker was indicated. It is impracticable, however, to present this phase of the subject satisfactorily in the present report.)

SELECTING FRUIT FOR EXHIBITION.

PROF. F. N. FAGAN, State College.

It should be the object of a fruit exhibit to show the exhibitor's skill in growing high-class fruit. The fruit is the result of his labor. The fruit should also be his advertisement, and therefore should be samples of his product. While we consider that show fruit should be selected according to given ideals, the same ideals are to be found in preparing fruit for market and thus the exhibit and the market are connected. The important points or ideals are as follows: 1. True to name; 2. Fruit free from blemishes; 3. Fruit of good (a) color, (b) size and (3) shape, for the variety they represent; 4. Uniformity of the specimens one with the other, (a) uniformity of color, (b) of size, (c) shape, (d) evenness of maturity.

Methods Used in Selecting the Fruit for Exhibit.

One should begin with the tree as soon as a set of fruit is established. All growers have trees of given varieties that they know from past years are equal to producing fruit of fine appearance, typical of the variety in question. These trees should receive good attention, but not overdue attention for in case the "pet" tree received undue attention in regard to spraying, thinning and etc., its production would not be an honest advertisement of the main crop of the orchard. It is for this last reason that the shows bar the fruit resulting from excess thinning. After careful growing has been given, then extreme care should be given to the picking. All precautions should be given to prevent bruising. After picking the crop from the trees bearing the fruit of each variety, the grower should make his first selection. Select with the ideals in mind that are above stated. One should select more fruit at this time than he expects to exhibit to overcome a shortage that might occur on account of accident in storage.

The storage of exhibit fruit is not so different from that for commercial purposes. In case of fruit for shows coming in early fall, it will not be necessary to place the winter and fall varieties in cold storage but for late summer varieties it is sometimes advisable to put them in cold storage or in cases of summer and fall varieties of plums, pears, grapes, and peaches. It has been noticed that fruit keeps better in storage if each specimen has been wrapped in paper. In cases, except grapes, one will likely have better success in keeping his fruit if each specimen is wrapped and the entire lot stored in comparatively small packages. One main point in storing either in cold storage or in ventilated store-rooms or cellars is an *even temperature* and for most fruits, this temperature should be between 32 degrees F. and 38 degrees F.

I wish now to consider more closely the ideals to which I have referred. These ideals generally make up the judging feature of a score card.

True to Name is an ideal of much importance, for we should not mislead the public. In case you do not know the name of a variety, it is best not to enter it at all or enter it as an un-named variety with the hope that some one will see and give it the correct name.

Freedom from Blemishes.—This is one of the main ideals for if fruit is free from blemishes, commonly caused by insects, fungous, spraying scald, etc., it is a sign of the growers thoroughness in spraying operations. At least it indicates such thoroughness in most fruit sections of the East, for as a whole we are troubled with fruit pests. Freedom from blemishes with many judges will carry as high as 25 to 50 per cent. of the total possible 100 per cent. a plate, box, barrel, or a collection of each could receive, and in some shows fruit showing signs of insect or fungous injury is even barred from the stands.

Fruit of Good (a) Color, (b) Size and (c) Shape.—The "color" in commercial fruit plays an important part in its sale. It has been said one should select color typical for the variety. In general, the more the color the better for show fruit, but we should select for the color that is typical for the variety in the region of the country where same is grown. (b) "Size" is nearly equal to color as far as most judges are concerned. They give about 10 to 15 per cent. out of the total 100 to this ideal, for the correct size of the variety, while color will carry from 15 to 25 per cent. Good, typical size for the variety does not mean the extra large ones, which would be called "monstrosities" if placed on the commercial market; however, a little over the typical size would be better than a little under. (c) "Shape" is more difficult to select because shape of a variety often differs within the variety; however, in such cases we should try and select for the typical shape of that variety in the region where located. With a judge, shape will carry less than size—about 5 to 15 per cent.

Uniformity.—This ideal is nearly as important as is "freedom from blemishes." It refers to the likeness of one specimen to the other within the variety, such as the likeness of all the specimens on a plate, in the box, barrel or likeness of one plate to the

others if in a five-plate class of one variety, or one box with other boxes, as in the case of a five-box class, etc., to a car-load entry for that matter. "Uniformity" is given a place in a show because in commercial work on the market, "uniformity throughout a box or barrel is highly desirable. The customer when buying a barrel of apples, pears, or a basket of peaches or plums has often been disappointed in the past and will be, no doubt, in the future because of the various shapes and sizes of the fruit in the package. Generally the large, best-appearing ones are on top. Most all customers notice these things and in most cases the producer and packer does also. One should select specimens as near alike as the old saying implies "alike as two peas in a pod."

STRAWBERRIES.

F. H. FASSETT, *Meshoppen, Pa.*

The growing of strawberries offers to the grower quick returns and sure profits. The amount of profits depends entirely on the grower. There is no fruit that responds so well to good care and ideal conditions. The possibilities in strawberry growing, to my mind, have never been reached. We ought not to be satisfied with less than \$250.00 net per acre.

The selection of a site is quite important. I think a sandy loam is an ideal condition, and yet we find them growing on many different types of soil. Strawberries demand a large amount of water, and the site may be on the lower or bottom lands, and yet a site on which stagnant water stands would not be best. They will do well on land that would be wet for some of our tree fruits.

The preparation of a bed should begin one year in advance, for two reasons; first, that we may fill the soil full of vegetable matter to enable it to better conserve the moisture and to get rid of some of the hand work. An ideal preparation would be to plow down a good, heavy sod, planting it to potatoes, early sweet corn or some crop that demands clean tillage. Allow no weeds to grow and we will not have so much trouble to keep them down in the strawberries; and incidentally we help to control the white grub, the great enemy of the strawberry plant.

As soon as the crop is harvested, sow some cover crop, crimson clover when it succeeds well, or hairy vetch. The following Spring plow this under, using a jointer, and plow deep, leaving the furrow on edge at an angle of about 45 degrees, then pulverize the soil very thoroughly to the depth of four or five inches. Do not leave it lumpy, make it fine by repeated harrowing. When ready to set, roll or plank the field, in order that the setter may more readily know where the top line of soil is. It is very important that the plants be set just the right depth in the soil. If too high then the plant dries up; if too low, then the dirt washes into the crowns and rots them. The plant should be set so the top soil comes about half-way up the crown, or about one-half inch above where the roots start out. We may set strawberries in the fall about

August or 1st of September, but will not get much of a crop. The spring is the best time; just as early as the ground will permit working.

There are three sources from which to secure plants. Grow them yourself, buy from a local grower, or from a man who makes a business of growing plants for sale. If you do not grow your own plants, then if you have a local man who is careful enough so you can get the varieties you desire, I would prefer to get them from him. If not, then we have to get them of the man who makes a business of growing plants. I think it best to throw away all weak plants, only using good strong ones, then we are not apt to have any misses. We must have a good solid row.

We do not care to say much about varieties because it is hardly possible to name any number that would be best in all parts of the state. We have found the varieties that are imperfect bloomers to be the heaviest yielders, and we are using just enough perfect flowering varieties to cross-pollinate, using two rows of imperfect ones, always commencing and ending with the perfect flowering varieties. We are now growing Haverland and Sample, fertilizing with the Wm. Belt.

Do not expose the plants to the sun or wind, as it will soon wilt them.

It is immaterial how we set them, only so we get the roots straight down and well firmed in the soil. It is best to trim the roots to about two and one-half inches long. One of the ways to determine when the plants are firm enough in the soil is to follow after the setter, take hold of a leaf with thumb and finger, and if it is not firm enough to break out a leaf then it is not firm enough to grow.

There are a number of ways of setting, and our markets ought to determine how we shall set. If we have a market that will pay a premium for fancy berries then we can use the hill system, otherwise we think it best to use the narrow, matted row. Rows 4 feet apart, plants 18 to 24 inches in the row, make a narrow matted row.

As soon as we are done setting we should commence cultivating, and cultivate often, never allowing any crust to form on top of soil. We want to consume all the moisture possible. Cultivate up late in season, then mulch with some material to the depth of 3 or 4 inches. A material that does not have seeds to sprout up to bother in the spring is best. Clean rye straw and swamp hay are among the best. The mulch not only helps to hold moisture but insures clean berries and a clean place to pick.

We should only use good, clean, white baskets, and always standard measure, and good, clean crates. Don't use old dirty crates; you will lose money by so doing. Have your berries alike all the way through the crate and the basket. Make it as attractive as possible.

The best time to grade them is in the field as they are being picked. To attempt to grade after picking usually results in soft berries and lower prices.

There are a number of insects that demand our attention. The

more important are strawberry leaf roller, strawberry saw-fly, and strawberry crown borer. These may usually be held in check by the application of arsenic sprays. There are also some leaf rusts and other fungous diseases that may be held in check by the use of Bordeaux Mixture 4-4-50. We have found it more economical, as well as more profitable, to immediately after picking plow down the bed and seed to clover. In this way we can control the insects and fungous diseases cheaper than by spraying and grow a new bed each year, making our rotation clover, potatoes and strawberries.

I am sure that the growing of strawberries may be used as a side line by many fruit growers and will be found to be very profitable.

Vegetable Section

A special session for vegetable growers occupied both morning and afternoon of the twenty-first. The following papers were presented and fully discussed.

SOME SPECIAL PROBLEMS.

PROF. W. B. NISSEY, *State College.*

If I were to ask each gardener present to present me with a list of what he considered his special problems, I am sure I would receive no two lists alike and the total differences would make quite a lengthy column. One is at a loss to know where to begin, and the most important problem for one grower may be a slight one for another. I have chosen several topics which I believe affect gardeners quite generally. They are, (1) Crop rotations, under which we might include "succession," cropping, and to some extent "companion" or "Inter" cropping. (2) The labor problem. (3) Advertising, and (4) storing of vegetables. I might incidentally say that the marketing problem and the important subject of "co-operation," with which our agricultural magazines and papers are full to-day, are of great importance; they have been fairly well set before the public and I will confine myself to the topics mentioned.

Crop Rotation.

Beginners in gardening, and even our experienced gardeners, who have a limited area of ground and very often limited supply of manure, are at a loss to know just what combinations to use for rotation and inter-cropping.

Climatic conditions, soil conditions, and markets are so variable in different localities that each person will have his special problem.

Rotation is one of the simplest and most practical ways to increase the income of the garden without much increased cost of production. It is beneficial in the prevention of fungous diseases and makes it more difficult for insects to locate the patch of vegetables on which they live. It is therefore insuring the safety of one's crops. Do not plant vegetables that are subject to the same insects, as cabbage and cauliflower, onions and radishes, etc. All leaf crops which require large quantities of nitrogen should not be grown through a number of years in succession, but should be followed with legumes, etc. Here are some good rotations that have worked out very satisfactorily and that are well adapted to each other.

1st year, Sweet Potatoes.
2d year, Melons or Cantaloupes.
3d year, Irish Potatoes (Corn and Pole Beans planted between the rows at last cultivation.) At last cultivation of corn, sow Peas, Clover or Rye.

Plow down the strawberry bed. Plant it to beans or late tomatoes. The next year it is in fine shape for melons or potatoes.

Do not follow early cabbage with late cabbage, or early potatoes with late tomatoes.

Early peas in April and sweet corn, June.

Early peas and late cabbage.

Onions from sets marketed July 15, followed with late cabbage.

Spinach and onion sets followed by peas, beans, lettuce, radishes, onions, celery, etc.

In sowing onions for ripening, sow every other row with white ones, for bunching. Where these bunch onions were one can set celery, lettuce, endive, etc.

Follow strawberries with beets, radishes, lettuce, etc.

Strawberries followed by late celery, very good, as well as getting the bed ready for the next season.

Lettuce and radishes between rows of asparagus in late summer if rows are far enough apart.

Celery or beans will very nicely follow an early crop of cabbage.

Cabbage and cauliflower inter-planted with horseradish.

Peas, rows four and one-half feet apart, followed as early as possible with potted tomato plants between pea rows.

Onion sets, 4 inches apart, alternating every fifth row, with early potted celery plants, etc., etc., etc.

There are many other combinations which can be worked out equally well as those just mentioned. Much depends on the person and his natural ability to keep things going all the time. One is apt to neglect sowing and planting just at the time it ought to be done and so lose the opportunity to make the land produce what it is capable of producing. Feed the soil well, and ask big and many returns from it in payment. Never let it lie idle. If vegetables cannot be sown any more that season, sow to oats, barley, vetch, millett, etc., and plow it under. The harder you work the soil intelligently, the harder it will work for you.

Labor.

When most growers of vegetables are approached on the labor question, they throw up both hands almost without exception and tell you that it is undoubtedly the most serious and greatest question of the day. The trades with the short hours and big pay demanded by the labor unions make inviting and profitable employment for the class of men who would otherwise make intelligent and skilled help in the garden.

There is only one class of skilled help available to-day, and they are professional gardeners who have had experience in private

gardens and who ask wages that preclude their consideration. One has to put up with such help as can be obtained, which is usually Poles or Italians in the rush season hired by the day. Ordinarily they have to be continually watched and directed, as they seldom have much if any knowledge of the work, unless they have worked along similar lines. The grower who needs a limited number of men who can do all phases of the work usually has a difficult proposition on his hands. Where a large number are employed, the work can be divided into different groups and one group do one thing all day long. The foreigners are fairly efficient in this sort of work, provided they are governed by a good boss. The teamsters and bosses should ordinarily be Americans. Some growers make use of a number of high school students during vacation, but the trouble comes in September, when they return to school about the time the late cabbage and celery needs attention. A certain grower in Illinois raised about five acres of cucumbers for the pickle factory. Not being located near a town large enough to furnish sufficient help for picking, he devised a novel plan to get his pickles to the factory. His great trouble began after school opened in the fall but having an auto he came to the schoolhouse about the time school was over, loaded up about a dozen boys and took them back with him; they picked for about three hours after which he took them back to town. Some boys wanted the auto ride as much as the money, and as a result they secured a little of each. Some growers have attempted to put unskilled labor on piece work, but this has not worked out as well as expected.

One way to solve the labor problem is to try to avoid rushes. Plan to have the work fit in such a way that while there is always plenty to do, the same number of hands can handle it from March 1st to January 1st. A grower from Massachusetts (S. A. Noble) who has had twenty years of experience, and who has hired men of all nationalities and descriptions, has decided that the German is the most efficient and reliable help, quick to adopt new methods and is very industrious. But on account of their ambition to start business for themselves and their instinct for saving, they seldom stay more than two or three seasons. Unskilled labor ranges ordinarily from one to two dollars a day, depending on the locality. Some growers are so located that two dollars a day is the minimum and skilled labor is from \$60.00 per month up. On account of not being able to hire competent help at all, and on account of wages, such as I have just mentioned, many growers have had to reduce operations fully 50 per cent. in the last few years and have been forced to resort to permanent crops, such as small fruits, asparagus and rhubarb instead of the quickly maturing vegetables.

It seems to be evident that the salvation of the trucking business must come through higher prices for their produce which will enable the grower to hire skilled labor, as the mercantile concerns do. What the grower does not care to do is to break in new men each year. They want men who will stick year after year after they have once learned the business and can be trusted to go to work when the grower is absent and do things right. I believe that if the grower would try some scheme to get his laboring class interested in the business and in the crops they would do much

better work, and they will be much better satisfied. If a small percentage of the net profits, say 5 per cent. is divided among the laborers they would feel that they held a financial interest in the crops and therefore work better. They will work harder, longer, pack and grade more carefully and in the end, I believe would increase the profits to such an extent that the grower would never feel the loss of the five per cent. and at the same time have permanent help.

Advertisement.

This is an age of keen competition when men in all lines of business are using printer's ink to set their merchandise before the public and it behooves the farmer to do likewise. It is well worth your effort in dollars and cents and will build for you a reputation which will stand indefinitely. It is an excellent thing to let your produce advertise itself, but the people should know who raised them or in some way know where to get more of the same quality. Then when Mrs. A. goes to the green grocer, she will ask for lettuce raised by Mr. B., or if Mr. B. calls at Mrs. A.'s house and the little daughter calls upstairs and asks her mother whether she wishes any strawberries, the mother is likely to say, "who is it?" "It is Mr. B." "Yes, I do, tell him to walk right in." (1) Every grower should have a well-chosen name for his farm. (2) The circulating of business cards to keep yourself constantly before the public. This might also include letter heads. (3) Bulletin boards along the road for autoists. (4) Advertising in local newspapers is probably one of the best means. (5) Displays in store windows are very catchy and bring results. (6) Exhibits at county fairs, grangers meetings, *State Horticultural Associations*. (7) Stencilled packages.

Grown by
John Brown,
York, Pa.

Fruitvale Farm.

(8) Place your card in each package. (9) Stamped wrapping paper.

Storing.

If I was to judge the vegetable growers' problems by the inquiries that came to my desk, I would surely put "storing" down as an important one. While I do not propose to go into a detailed discussion on this subject as a volume could easily be written on it I will emphasize a few things which I believe to be all essential and if these essentials are properly cared for, there should be little trouble.

1. In the first place, a vegetable that is expected to be stored should be properly grown to get the maximum results. In all cases, with the exception of tomatoes, celery and probably a few others, the vegetable should go into storage in a ripe sound condition; the exceptions just mentioned must be stored in an unripe state out of necessity.

2. Careful handling and packing when taken up and put into storage. Too much stress cannot be laid on this point. Each bruise or cut will give proper conditions for disease, and if rough handling is permitted rot will start and soon spread through the whole crop. The vegetables should be as clean as possible when put into storage—all signs of disease, insects, etc., should be kept out of the storage pit or house.

3. There must be proper conditions during storage. Each kind of vegetable requires a different method of storage, and these requirements should be known thoroughly beforehand. For example, squash and pumpkins need a fairly warm, very dry, place. About 50 degrees with little variation is desirable, placing them on racks two or three deep so that heat can readily circulate is good. Onions want a cool dry place, storing in crates with plenty of isles or air passages, or place them in slatted racks. Keep the temperature as uniform as possible but not below 32 degrees. Cabbage, if stored in cellars, should be placed on shelves or racks; ventilate well so that cool air can be admitted at night and warm air shut out in daytime. Condensation must be prevented; keep the temperature uniform and low without freezing. Cabbage may also be stored in pits. Celery in many cases is a treacherous vegetable to store. One must be very careful not to store stalks infected badly with disease. Then again ventilation and moisture conditions must be carefully watched. It is often trenched in narrow trenches of indefinite length, placing boards along the sides. When the celery is packed, pull up the boards until they come together at the top, forming a water-shed, and also leaving an air space over the stalks. Storing in an excavated cold frame with an air space between the stalks and glass and straw, or fodder, on the glass, and sometimes a layer of ground over the fodder. Ventilators are sometimes necessary also. All root crops seem to keep fresher looking when stored in pits. A root cellar can be used by covering the vegetables with soil to prevent drying out.

1. Vegetables should be properly grown.
2. Care in handling and packing in storing.
3. Proper conditions during storage.

GRADING AND PACKING VEGETABLES.

By H. C. THOMPSON, U. S. Department of Agriculture,
Washington, D. C.

Grading and Packing Vegetables.

Assuming that the grower has produced a good crop, such as will be in demand upon any good market, the price he receives will depend largely upon proper grading, packing and marketing. Too few growers realize that the appearance of the product is of prime importance. A fancy product will not bring a remunerative price if poorly packed in dirty, unattractive packages. In fact, an inferior product, well graded and packed, will bring a higher price than a

better product poorly graded and packed. It is evident, therefore, that to bring the highest prices, vegetables must be of good quality, well graded and sorted, put up in neat, attractive packages, and be put on the market at the time when there is a good demand.

Grading Vegetables.

In grading vegetables, the grower should bear in mind that the poorest product in the package determines the price received for the goods.

Careless and dishonest methods of packing of fruits and vegetables have led to many of the difficulties that have arisen between the growers and dealers. The method of putting small and inferior fruit and vegetables in the center or bottom of the package and topping off with first-class products, is entirely too common. In some cases, the farmer thinks he is "putting one over" on the dealer, but this is not the case. In fact, the dealer often takes advantage of such practices by reducing the price more than the quality of the produce justifies. The writer has very little sympathy for the grower who is always complaining that the dealer has taken advantage of him. If the product is honestly graded and carefully packed in neat, attractive packages, the prices received will usually be satisfactory.

In grading most products, it is important to make two or three grades. The first grade, which might be called "fancy," "prime," or similar terms, should include only those specimens that are the best in quality and appearance. This grade would include the average size rather than the large or overgrown specimens, and should be uniform in every particular and free from injury of any kind. The second grade would include good, marketable produce, but not fancy. In this grade would, ordinarily, be included all that is not put up as first grade, with the exception of culls. The culls should never be put on the market with the other grades, as they will lower the prices of the better grades. It is better to throw away the culls or feed them to live stock than to try to dispose of them on a low market.

Many growers, who grade their produce when the price is high, stop grading when the price drops. This should not be, because when the market is glutted it is only the best that will bring a remunerative price. The lower the price and the more plentiful the product, the more rigid should be the grading. When the market is glutted, low grade produce will not pay the cost of transportation and marketing, and for this reason only the best should be offered for sale at such times. The low grade goods will compete with the better goods, and, as a consequence, the price on the latter will not be as high as it should.

In grading and packing vegetables, the part of the package which is exposed, when offered for sale, should give a correct indication of the contents of the entire package. In other words, the practice of topping off a package with a higher grade of goods than the entire package contains should be discontinued because it is a deception. The writer realizes that most growers who follow this

method do not intend to deceive their customers, but this is the case. Absolute honesty in grading and packing will pay in the long run. A grower who puts up a uniform grade of goods will very soon attract attention and his product will be called for by the consumer.

The writer believes that all goods put up in packages should bear the name and address of the grower and the grade of goods contained in the package. Whenever a grower puts his name on a package, he is going to see that the goods are up to standard. This is proven by the fact that growers who use a label, which contains his name and address, seldom, if ever, use it on inferior goods. In other words, he does not want the consumer to know that he put up the inferior product, but when he has first-class goods he wants his name on the package. A neat, attractive label serves as a good advertisement for the grower and stimulates business.

Types of Packages.

It is impractical to give here specific information in regard to types of packages that should be used for all vegetables under all conditions. However, a few general suggestions may not be out of place. Packages for any commodity should be strong and well made; should be of standard and full measure; clean and bright; adapted to the product for which it is intended; of such size and shape that it can be conveniently handled and stacked in cars or wagons; and, when opened, should expose the fruit to good advantage. The package should be cheap, but the other points should not be sacrificed for cheapness. That the box, crate, basket or barrel should be well made is very evident, but this is not always the case. The standard celery crate used in the north is not strongly made and often goes to pieces before the product is sold. This crate is too large for convenient handling. The writer believes that a smaller crate would be more satisfactory, because it can be more conveniently handled, does not break up so badly, and when used in storage, the celery keeps better than in a larger crate. The shape of the package is very important from the standpoints of stacking in cars, from the appearance, and the carrying of the goods. Tomatoes should not be packed in long, narrow boxes or tall hampers, because the weight of fruit will crush the lower layers. For such commodities, wide, flat baskets or boxes should ordinarily be used. The four or six basket carrier is one of the best types of packages for tomatoes.

Old, weather-beaten, dirty, or damaged packages should never be used, as they detract from the appearance of the goods. A first-class product put up in unattractive packages will not bring a good price. Packages, when bought some time before being used, should be stored where they will be protected from rains, and can be kept clean.

The package should be cheap, as it is given away. It is much better to have a cheap gift package than a more expensive one which will be returned, but it must not be so cheap that it will fail to present the goods in an attractive manner. The grower should al-

ways bear in mind that the container helps or hinders the sale of the product, depending on the appearance of the package.

For a retail trade, it is advisable to put up the product in such size packages that the consumer will take an unbroken package. Even where the goods are sold wholesale or consigned it is sometimes advisable to pack in such size containers as the consumer can take home with him.

Growers have been giving most of their attention to the production of vegetables and entirely too little care and attention to the grading, packing and marketing of their products. All these factors should be thoroughly studied, as lack of attention to any one phase of the work will materially reduce the returns. No matter how good the product, if poorly graded and packed, they will not bring good prices under ordinary market conditions. If the goods are of high quality and well sorted and are poorly packed in unattractive packages, they will not sell to good advantage. It shows lack of good judgment for a grower to put first-class goods in a second or third class package, or to put first, second, and third class goods in the same container.

The sooner the grower makes a careful study of the grading, packing, and marketing of his goods, the sooner he will be on the road to success. We should bear in mind that our lack of success is due to our own limitations rather than to the limitations or dishonesty of others.

IRRIGATION AS A FACTOR IN VEGETABLE GROWING.

By A. M. SEABROOK, *Bridgeton, N. J.*

During the last few years "The High Cost of Living" and the "Conservation of Our National Resources" are two of the questions that have come before the people for discussion and consideration. Despite the effect that the cold storage of our food supplies may have upon prices I believe that the cost of living is, and always will be largely determined by the law of supply and demand. I have little faith in the theory that the cost of living can be regulated by legislative enactment, and do not believe that our present tariff law will make any material difference in the cost of the necessities of life to the consumer.

The first essential in reducing the living cost is the elimination of our waste. It is said that we are the most wasteful nation on the globe. If the waste from our tables and culinary departments could be eliminated there is no question but what it would have a decided effect in the reduction of the cost of foodstuffs.

The further solution of this question lies in increased production. This can be brought about by the conservation of our water supply for irrigation purposes. We do not need to increase our acreage, but the great need is to increase the yield from the acres that we already have. It is a well known fact that the yield of produce in European countries is far in excess per acre of what it is in this country. The question may be asked, "How is the farmer

to be benefited if he has to place his product on the market for a lower price than he receives at the present time. In reply to this question it may be stated that if the farmer can double the amount of his product per acre the corresponding reduction in the cost of producing it will enable him to sell at a much lower figure and still make a larger profit than at present. It costs very little more to produce 500 bushels of potatoes per acre than it does to produce 250. If the farmer grows the latter quantity and sells them for \$1.00 per bushel his receipts are \$250.00 per acre. On the other hand if he grows 500 bushels and sells them for 75 cents per bushel, his receipts are \$375.00. Under these conditions he is much better off and the consumer is getting his table supply for twenty-five per cent. less than under the former condition.

The three essentials that enter into the growing of a full crop are fertility, cultivation and moisture. We may, however, have our soil in the highest state of fertility, give it the very best of cultivation, take the utmost care to protect our crops from insect pests and disease, and still fail to gather a full crop, because there has not been sufficient moisture to bring it to maturity.

I have chosen this subject this afternoon because I believe it to be one of the most vital and most practical questions for the consideration of the vegetable grower. In the arid regions of the West, the necessity and practicability of irrigation were long ago recognized, but it is only in recent years that the subject has been given attention and its practicability recognized in this section of the country.

Secretary Lane, in his annual report, recommends that the government appropriate \$100,000,000.00 to be used in the next ten years in extending irrigation in the western states. Irrigation in this section is not as necessary as it is in the West, but it is just as practical. In all sections, even where there is ample rainfall, it is so irregularly distributed that droughts are frequent and crop shortages prevalent.

We utilize our water supply in the form of steam to run our railroad trains, steam boats, factories and mills, thus adding to the progress and wealth of our country, and you say that this is practical. The vast power which was locked up in Niagara for centuries has been unlocked in recent years and is being utilized to run electric trains and operate industrial plants over a large extent of country, and we admit that this is practical. It is just as practical to take the water from your streams, or even artesian wells, and utilize it in the growing of your crops.

In our experience as vegetable growers we have found irrigation practical for the following reasons:

- 1st. It insures a perfect germination. Under favorable conditions ninety-nine per cent. of the fertile seed will germinate.
2. It insures a quick growth.
3. On the average it will double the amount of produce per acre, photographs were shown where the crop was more than double that on adjoining ground without irrigation.
- 4th. It produces a crop of superior quality. Vegetables contain

a high percentage of water, and to get the best quality they must have sufficient moisture to properly mature them.

5th. Irrigation grown vegetables command the very highest market price.

There are some essentials to successful irrigation which must be always considered, as follows:

1st. An abundant water supply. A never failing stream is preferable, where this cannot be had, artesian wells can be used.

2d. A high state of fertility. Fertilizer containing a formula suitable to the needs should be applied to each crop.

3d. Best quality of seed, both as to purity and quality. All seed should be tested.

4th. A quick succession of crops. From two to five crops can be grown per season. Intercropping can be done successfully.

Though irrigation has proven to be practical and profitable it must not be regarded as a cure-all for insect pests and crop diseases. These must be contended with under all circumstances, but under irrigation they are reduced to a minimum, for crops grown upon highly fertile soil with a normal condition of moisture are not as susceptible to the ravages of insects and disease as where there are severe droughts or even where there is irregular rainfall.

ROUND TABLE DISCUSSION.

The round table discussion on varieties was conducted by Prof. R. L. Watts.

Among the characters desired in all varieties of vegetables, special emphasis was laid upon the following:

Trueness to Type.—The need of being able to secure seed true to type was emphasized by a number of the members present.

Quality.—There is a tendency to require vegetables having better quality than formerly, since by producing vegetables of this kind the consumption may be increased.

Appearance.—More attention should be given to the appearance of vegetables when placed on the market, since a well graded product put up in an attractive package is much more liable to be sold than where the work is careless and poorly done.

A number of the important truck crops were then considered, the first of which was celery. Mr. R. H. Garrahan, of Kingston, prefers White Plume for the early crop. He stated that his trade prefers this variety although it will not hold up as well as do some others. Mr. H. F. Thompson, Washington, D. C., stated that Golden Self-Blanching is of better quality when grown on muck soils than on other soils, and emphasized the point that when thus grown the ribs are considerably smaller. Chicago Giant was said to be a good medium early variety. It is a summer celery with a winter flavor. Mr. Shallcross, of Harrisburg, prefers the Golden Self-Blanching for his market. Marshall Ben, of Stokesdale, stated that ninety-nine per cent. of the celery grown for the early crop in his vicinity is Golden Self-Blanching. Mr. Seabrook, of Bridgeton, N. J., prefers Winter King, and Magnificence for the late crop. A

number of the members find Winter Queen and Giant Pascal to be satisfactory.

Cabbage.—Mr. Abram Hostettler, who grows cabbage for the Johnstown market, prefers Copenhagen Market, Jersey Wakefield, and Charleston Wakefield, for the early crop. His experience has been that Copenhagen Market matures evenly, and he prefers it to the other varieties. Mr. R. H. Garrahan, Kingston, who is close to the Wilkes-Barre market, also Harry Pearce, of the same place, have not found Copenhagen Market to be satisfactory for their conditions. They recommended Jersey Wakefield for the early, followed by Enkhuizen Glory and Succession for the midseason crop, and for the late crop, Danish Ballhead, Succession and Surehead. Some of the members recommended the use of a ton of fertilizer which will analyze six per cent. of nitrogen, eight per cent. of phosphoric acid and ten per cent. of potash applied to the ground before the planting is made. After the plants become established, this is supplemented with from four to six hundred pounds of nitrate of soda per acre.

Tomatoes.—For the extra early tomatoes, some were of the opinion that a good strain of Earliana was the most satisfactory. Some have found Bonny Best to be superior. These varieties followed by Chalk Jewel, Matchless and Stone, will give a succession of cropping. Where the purple fruited varieties are desired, June Pink, Beauty and Globe were recommended.

Beans.—Stringless Greenpod and Burpee's Stringless were general favorites. For the pole lima beans, Early Leviathan, King of the Garden and Dreer's Improved were general favorites. No one present was successful in growing bush limas on heavy soils.

Sweet Corn.—Adams' Extra Early, Burlington and Evergreen were varieties generally considered to give the best results. These may be planted on the same day and will give a succession for the market. Some members have found that Burlington matures sixty days from the time of planting. Mr. Hostettler grows White Cob Corry and Pocahontas, Kendal's Early Giant and Stowell Evergreen. His average is one thousand dozen per acre, and when planted on the same day these varieties mature over a considerable period of time. Mr. Settemeyer, of Wilmore, finds the variety Howling Mob, desirable for his market. It was generally considered that Golden Bantam, where known, is a general favorite.

Peas.—Nott Excelsior was generally found to be of good quality, but small. Some consider that the variety Thomas Laxton is to be preferred.

SUMMER MEETING

The 1913 Summer Meeting was held at Gettysburg, September 10 and 11. The afternoon and evening of the 10th were occupied by a program—two of the papers are here given.

On the 11th about thirty automobiles took the guests through the apple belt and a few of the orchards of Adams County. In this trip and in a bounteous luncheon served in Fruit Growers Hall at Bendersville, at the end of the trip, The Fruit Growers Association of Adams County acted as host to the State Association. The Fruit Growers Association of Adams County deserve unstinted praise for the liberal entertainment provided during this trip and luncheon. It would have done every member of the State Association a world of good to have taken part in the trip.

A CLOSER UNION BETWEEN GROWER AND DEALER.

By R. G. PHILLIPS, Rochester, N. Y., Sec. International Apple Shippers Association.

I am down on your program to speak on the Sulzer Bill, and that subject has been announced to you this evening. It came about in this way: Sometime ago your officers requested me to speak on the "Middleman," or along the lines of a closer union between grower and dealer. I was not then sure of having the necessary time to prepare such a talk and suggested that my subject be put down as "the Sulzer Bill," with the understanding that if possible I would take up the original subject. Circumstances so shaped themselves that I shall be able to comply with the first request and talk to you for a little while concerning the "Middleman."

A few years ago, when the New York Central Railroad was putting in a siding back of our warehouse on Railroad Street, in the city of Rochester, the foreman in charge of the work was accidentally killed by stepping backward on to one of the main tracks. His name was O'Brien, and from the nationality you may judge he was popular, not only with the men under him, but also with the officials of the road. He had risen from the ranks, starting in as a green boy from the old sod with his pick and shovel. He was very proud of his position, but Mrs. O'Brien went him several better. She was so proud that she disliked to be reminded in any way of the time when Denny himself wielded a pick and shovel.

Well, the next day I went down to the house to offer my sympathy, and Mrs. O'Brien insisted that I should come in and view the many and beautiful floral offerings. "Yes," she went on, "them flowers do be showin' how many friends he had. That pilly came from the Master Mechanic; this wreath was sent by the Division

Superintendent, and that broken calum came from the Mayor himself." Then she paused, as her eyes rested on a beautiful floral anchor which she grabbed savagely and flung out of the window, exclaiming as she did so, "Who the devil had the bad taste to send that pick?"

First of all I hope this won't prove to be anybody's funeral, especially mine, and I don't want you to mistake me for a pick and throw me out of the window. I do not come in that antagonistic form, but rather in the spirit of friendship and good will, even though I am a representative of that much maligned and misunderstood person, the middleman.

Our former President, Mr. Loomis, tells this story, illustrating the general high plane in the world's work which the so-called middleman, dealer or commission merchant occupies, at least in the minds of certain people. Probably you have heard it many times, but, anyway, I will repeat it. It seems there was a minister who had a son and the good man was exceedingly anxious to select for him the precise vocation in life for which he was most suited. One day he said, "Wife, I have received an inspiration as to how we can settle this tremendous question. We will take our son to the attic and leave him there along with the Bible, a silver dollar and an apple. After a time we will look in and if he is reading the Bible, which I trust he will be, we will make a minister of him; if he is interested in the dollar, we will make him a banker, and if he is playing with the apple, we will make him a farmer." So they took the little fellow to the attic and there left him. At length they tiptoed cautiously to the door and looked in, only to find the boy seated on the Bible, clutching the dollar in his right hand and eating the apple from his left. The good minister was horrified and in despair. He said, "Wife, our son is not fit to be a minister; he doesn't know enough to be a banker; wife, our son is a hog—let us make a commission merchant of him."

From the dawn of history mankind has demanded a scapegoat upon whose head could be laid all the iniquities of the people that he might bear them away into the wilderness of forgetfulness. First it has been one man or one policy, or one political party and then another. They all get it sooner or later, and for that reason I do not know that the middleman should unduly complain at having been the "goat" for the last two or three years. Still, some things can go too far.

This attitude of mind illustrated by the story has been fostered and created largely by the yellow press, the sensational magazines, the notoriety seeking politician, the man with an ax to grind, and some well meaning individuals whose knowledge of the subject is chiefly distinguished by its absence. For example: The president of one of our railroads addressed a group of farmers in my State last fall and assumed to tell them how they were being robbed of their too splendid cabbage crop by this evil one—the middleman. He told them to build storehouses and lay the crop away until winter and reap the sure and certain reward of high prices that invariably came. Now this good man *may* have known something about a railroad, but what he really knew about the cabbage crop and

the problems of marketing was distinguished by its absence. Unfortunately for the middleman, not all of the growers heeded his advice, for in my State alone the remnants of hundreds of tons were drawn out in the spring from the storehouses and dumped on the land—a total loss, plus carrying charges.

This man knew nothing of the law of supply and demand. He was unaware of the fact that crops are raised to be consumed, and that one year with another they must be kept moving from the very time they are harvested, or disaster results. Evidently he had never heard of shrinkage or decay, nor comprehended that fruits and vegetables cannot be corded up like brake beams or yarded like old cars and kept from year to year. The fact that there could possibly be too many cabbages was a preposterous proposition to him. All he knew was that cabbage was cheap and that therefore the middleman was to blame for it. There was, and could be, no other explanation or cause; and he had the remedy and administered it with all the majesty of omniscience. Those who took it have my sympathy. Now, I may be wrong, but I imagine his suffering patients will call a real doctor the next time and let him attend to railroading.

Then again, you all know our good friend, Mr. Yoakum, formerly one of the head men of the Frisco Lines. For close to two years, and until this spring, it has been nearly impossible to pick up a magazine or the *Saturday Evening Post*, or newspaper without reading his attacks upon the middleman, coupled with hundreds of thousands of words of advice to the farmer how to run his business and exterminate this enemy of his happiness. And all the time he was delicately insinuating that the railroads should be allowed to raise their rates. He became an authority on the middleman to those who knew nothing about the subject. He made speeches from Texas to Chicago; he told the farmers how to milk and how to curry the horses; he was quoted as the very fountain head of wisdom on this subject, and editors wasted pounds of ink in their editorial columns praising this new Moses.

Now listen to the conclusion and the climax: It is very sad to relate that this spring Mr. Yoakum's railroad went into the hands of a receiver while he went to Europe. Now the question is, and judging by results, did he know any more about the middleman than he did about railroading?

Then, too, there has been this wonderful movement on the part of professors and politicians to uplift the farmer and redeem him from his ignorance, his sufferings and his poverty. To read the articles and the speeches and the projects, an uninformed person would think that the farmer was a barbarian and incompetent to conduct his affairs, and that the middleman was to blame for it. Up my way, and practically all over the United States, the farmers drive automobiles, wear diamonds, go to Florida and Japan in the winter, send their children to college, live well, have money in the bank and could lend a strong hand toward uplifting the uplifter. And as for competency to manage his affairs, I never yet ran on to very many fools on the farm—not enough to notice it. They don't grow that kind out in the open, under the sun and the stars, and with all of the Creator's infinite and wonderful forces about them.

We had a well meaning man up our way, again connected with a railroad, who for a time was engaged in this uplift movement, establishing model farms and telling the farmers how to raise and market larger crops. This was very commendable, but all the while he was thus engaged his own railroad was unable to haul the crops that were then raised, and the waste from car shortage, lack of motive power and delays was tremendous. An uprising was necessary to get relief and even since then there has been more attention paid to railroading than to outside lines.

It is my judgment that it would be better for many of these people who are so free with their attacks if they could answer like the Irishman did when his friend asked him what made his nose so red. "Faith," he replied, "me nose glows wid pride because it is stuck into nobody's business but me own."

For two or three years back the middleman has stood the abuse of the ignorant and malignant—those who know nothing about the business or its problems, and many who have cared less. One would have thought that this middleman was a jail bird; a robber of the helpless; a buccaneer of trade who had raised the black flag and scoured the high seas of life—a sort of Captain Kidd and Silver and Ben Gunn combined, who tramped the deck singing,

"Fifteen men on the dead man's chest,
Yo-ho-ho and a bucket of rum."

The fame of Francois Villon, student, poet and house breaker, has been perpetuated in song and story for five centuries, and yet he is but a crude performer compared to the middleman, if the deductions and accusations of the uninformed are to be believed. We have been made the scapegoat of every ill and the cause of all the sufferings of mankind. And all of this in spite of repeated investigations and facts proving the contrary.

A special committee, appointed by Governor Dix, of New York, known as the New York State Food Investigation Commission, consisting of William Church Osborn, Hon. Calvin J. Huson, Commissioner of Agriculture, and Ezra A. Tuttle, of Long Island, assisted by Horace V. Bruce and Raymond A. Pearson, investigated the high cost of living, the middleman and various methods of marketing, and filed their report last November. They found that the total cost of wholesaling, including profits, was about ten per cent., and of retailing thirty-three per cent. They furthermore found that these items were chiefly made up by cost of handling, and *not* profits. Will any fair-minded man say that ten per cent. is unreasonable for the wholesaler who must be on the docks or at his store from one o'clock in the morning until another night falls, and who out of this pays his rent, his deliveries, takes the risk of bad accounts, maintains a force of skilled men and who, by his energy in salesmanship, finds an outlet for these commodities? Is this an unreasonable profit and expense account combined, and in connection with products which are perishable and the packing and grading of which is often dishonest?

Much was heard at one time concerning the wide difference be-

tween the price the farmer received for eggs and the price the consumer paid. The middleman was straightway called a robber and continued to be until the recent investigation of the government settled the question. The government found, what every middleman knew, viz., that the waste from rotten and broken eggs was tremendous. In other words, everything that looked like an egg was shipped, whether fit or not. These bad and broken eggs have to be taken out and thrown away, or utilized for by-products. The consumer won't take them and won't pay for them, and the loss in shrinkage has to be added to what is left. I myself have taken as high as six dozen eggs which were absolutely worthless out of a single crate. I had the man who packed them in the office before I would sell the balance, for I didn't propose to be called a robber later on. Confronted with the goods, he admitted that he knew they were there and said they came from old nests under the barn. I had another man in the office who calmly admitted that he had stuffed 450 barrels of apples on us the preceding year and had tried it again. I had another man who felt that he had been wrongfully used when the same trick was discovered, and in great anger he exclaimed, "Well, that's the first time anybody ever caught me."

I could multiply these examples indefinitely. They are going on constantly all over this country, and yet the middleman is held up as the chief of all evil spirits.

The government made still another report in June of this year, in which he found that during the last twenty years of advancing prices, the margin between the producers' and consumers' prices had not widened much, if any, thereby conclusively proving that the middleman has not been enriching himself at the expense of either producer or consumer, and the attacks against him were unwarranted.

Now, then, what are some of the causes of the high cost of living? I will touch upon a single phase of the question, viz., the cost of high living, and omit all reference to the tremendous increase in the production of gold, which is alone sufficient to raise prices.

We have become a people who, because of the natural wealth and plenty of our country, have been prodigal of its resources to the point of waste. We have constantly demanded increased luxuries, service and utilities, both private and municipal. The farm has been deserted for the city and production has failed to keep pace with population on the basis which we knew twenty-five years ago. Hours of labor have been reduced to the point where it is almost time to go home as soon as the man reaches a job. With the shortening hours wages have constantly been increased.

Outside of the fields of actual utility consider the millions of dollars tied up in automobiles as a luxury, a product whose value shrinks by leaps and bounds with every month owned. The thirty-horse power man of to-day must own a sixty-horse power machine to-morrow, regardless of where the money comes from.

Travel by rail and boat has resolved itself into a question of speed, ease and luxury. Hotels of real and bizarre magnificence have been erected from one end of the country to the other. The service of kings is yours, surrounded by tapestries, and paintings, marble, granite, crystal, gold, silver and bronze. An army of serv-

ants clothed in white gloves and gold lace, wait upon you all the way from the curb to the thirty-second floor.

Look at the retailer for a moment: The store he occupies costs three times what it did twenty-five years ago. Added to that he must have the most expensive equipment, sanitary ice boxes, plate glass windows, mahogany show cases and quartered oak counters. His help must be clothed in clean linen coats every day. His deliveries must be many and expensive, and in addition to that he must have a special boy to take a yeast cake to Mrs. Jones when she is in a hurry.

Now, gentlemen, all of these things add a tremendous overhead expense for which someone must pay. When you buy an apple in the Astor House, you pay for the apple plus the luxuries and the service that surround you. When you buy apples from the grocer, you pay for the apples plus equipment and service.

Take the item of deliveries: On my street in Rochester there are twelve houses and deliveries are made by five different milkmen, five markets, six grocers, four icemen and five department stores, all weaving a web of unnecessary expense. And yet no man on that street would sacrifice in the interest of economy his sacred right of trading where he desires. Would we ourselves carry anything home? Never! Perish the thought! On some streets in every city it is a disgrace to carry a bundle, and the one who does it is socially ostracised. The truth of the matter is we don't want to be economical. Economy is regarded as something low and degrading. It is unmanly and unwomanly.

Take it on the farm. I can remember when I was a boy that the man who had a top buggy was regarded both as a king and a riotous liver. It was the end of human endeavor. We used to keep ours under a big sheet and never under any circumstances took it out in the rain, when the top would have been of real benefit. To-day thousands of farmers wouldn't look at a top buggy. They own automobiles and would drive them through the bottomless pit, if they wanted to go, with the gasoline tank on fire and the paint blistering on the body; throw it away to-morrow and get another.

Now the conclusion of the whole matter is this: The American people can't eat their cake and have it at one and the same time. If a man dances, he must pay the fiddler. I am not criticising any man for how he lives or what he does with his money. That is his business. He can have all the luxuries and service he desires, but I have absolutely not one iota of sympathy or patience with this constant wail about the high cost of living when the people themselves are largely to blame for it. And I have still less sympathy with the constant effort to find a scapegoat and to endeavor to saddle our own improvidence on the shoulders of the middleman. We love to blame some one else. We want a victim to sacrifice in the hope that our own sins may be washed away.

Now I have lived with the wholesale middleman a good many years. I have shipped him a good many thousand barrels of apples and hundreds of cars of other commodities. I have dealt with farmers, doctors, lawyers, carpenters, ministers, and bankers, and, take him all in all, I have found this much maligned middleman to be of

as high character, as reliable, as industrious and of as much use in the world as any other class. You will find dishonest men in every walk of life, but with few exceptions there is not much excuse in doing business with them.

The so-called middleman is absolutely essential and without him the wheels of commerce would come to a standstill. He is a specialist in an age of specialization. Life has become too complex for one man to do it all. A hundred years ago the individual was supreme. He raised his food, made his own clothes and shoes, constructed his own buildings and, in short, was sufficient unto himself. To-day no man is sufficient unto himself. If he can do one thing well, he is fortunate, and to that all of his energies must be directed. We are interdependent and need the co-operation of a hundred industries to contribute to our needs and efficiency.

In the city of New York alone look at the problem of distribution, where on some days more than a million packages of food arrive. Does it require no one to receive them, to care for them, to find customers and, by the power of trained salesmanship, find an outlet? Does it require no capital and brains and energy to handle this tremendous volume? Does it require no one to collect the money? And what is true of New York is true all over this broad land.

I suppose there are some good people who would advocate distributing the thousands of cases of eggs, tubs of butter, cars of water melons, berries, cantaloupes; potatoes, onions, apples and a hundred other commodities by parcels post. Last winter a committee of reformers in New York did advocate selling the apple crop in 10 pound packages by parcels post. That would have meant on December 1st, 1,200,000,000 pounds of apples, and 120,000,000 ten pound packages. A beautiful dream, wasn't it? Even had it been possible to get the fruit in this shape, or for the mail to have carried it, who was to find a market for it and collect the \$20,000,000 that it was then worth?

Now, in conclusion, let me read you what the great north-western apple country thinks of the middleman. I quote from the address of E. H. Shepard, of Hood River, Oregon, Publisher of Better Fruit, and a large grower of apples, and read at our Cleveland meeting:

"I am sorry to say that frequently, as I stated in my address at Niagara Falls in 1910, in my opinion the drawback to the fruit business being profitable is a lack of confidence between dealer and grower. In all cases of difference there is always right and wrong on both sides. By that I mean that both dealer and fruit grower has been subject in the past to criticism, and I want to say that in many instances this criticism was more or less justified. But do not misunderstand me; I do not mean to say that a large majority of dealers have been at fault, nor do I mean to say that a large part of the growers are to blame, but there has been sufficient friction to interfere with successful business, affecting both the pocket-book of the fruit grower and fruit dealer. You have your troubles—fruit growers have theirs. I believe this lack of confidence in many

cases in the past has been responsible for many of our present troubles.

"The idea exists with some that the middleman can and should be eliminated. Even some, I might say many, maintain that the fruit grower should sell direct to the consumer; that public markets should be owned and operated by the fruit growers and by so doing the high cost of living could be eliminated and the fruit grower made rich. Do not be quick to censure fruit growers who maintain these ideas. Be patient. Patience is a virtue. I believe it is your duty, I believe it is my duty, and I believe it is the duty of everybody who has had business experience, who knows business methods, so far as time and finances will permit, to try and create a better understanding of necessary expenses in distribution. By so doing we will all soon be educated to better understand the necessary business methods and ways of handling the fruit crop.

"I believe I am justified in saying that a large part of the fruit growers who believe the middleman should be eliminated are people who have never been engaged in any commercial business of any importance I think I am justified in saying to you that the firms who have engaged in handling the fruit of the Northwest, the associations, including their managers and directors, have some comprehension of the force, the number of men and the capital required to distribute the immense crop of fruit that is grown in the United States. Fruit growers realize that the fruit season lasts but a few months. We know that any concern that supplies the retail trade must keep its employes on the payroll by the year. We know it must pay rent for the year. We know dealers must handle other commodities, such as oranges, bananas, vegetables and various other products, and do a continuous business the entire year. We know that to conduct the necessary number of concerns in each of the many different cities and communities where our fruit is distributed would require hundreds of thousands of people and millions of capital. We realize that it is impossible for us to maintain such a payroll, or to stand the necessary expense of conducting such a business, or to raise the capital that is necessary. At the Washington State Horticultural meeting, held in North Yakima, January, 1913, both Mr. Gilbert and myself expressed ourselves in plain words, endeavoring to make it clear that the middleman is a necessity and that it would be practically impossible to eliminate him."

That address was read by Wilmer Sieg, of the Hood River Apple Growers Association. Mr. Sieg prefaced the reading of this address with the following:

"Gentlemen, I come to you from the Northwest, delegated by my friend Shepard, of Better Fruit, to read his paper, a paper carefully compiled and to which I call your attention. And I come to you from a new Northwest, I hope new in its affiliations—a Northwest that realizes that the sentimentality has gone out of the box apple and that we are down to the reality; a Northwest that wants to co-operate with you and not to antagonize in any respect; a Northwest that realizes and appreciates the *known* method of distribution and whose whole effort shall be toward co-operation."

Gentlemen, let us have a better understanding of each others'

trials and needs. Let us get together and work together toward the upbuilding of this wonderful industry, and not waste good time and injure progress by antagonism and bitterness. Our interests are identical. We cannot prosper without you and you cannot prosper without us. You are entitled to fair prices that will make you a reasonable profit upon your investment and for your labor. The dealer is entitled to a fair profit for his services and risk. More than that no man has ever yet received in the long run, nor will he ever receive.

You know the men who are trustworthy, who give you good service, who pay for what they buy and stand by their contracts. These are the men to do business with and to tie to. Give them your support and they will give you theirs, and both shall prosper.

ADVERTISING THE APPLE.

By U. GRANT BORDER, *Baltimore, Md.*

What is the most important problem confronting the apple producing business? Is it the selection of soil or location? Is it fertilizing, cultivating, pruning, spraying, assorting and packing? Important and necessary as all these are, they lose their value when there are none to buy the fruit at a profitable price. Then all those problems are swallowed up in the one great problem—Marketing.

A short crop has few marketing problems. A normal crop has many. What of a bumper crop? Consumption must be made to keep pace with production. This country cannot grow too many apples if marketing is made easy by insistant demand. Demand can be created by and through the power of publicity. Consumers, who are now satisfied to eat few, must be urged to eat more. Those who know little of the fruit must be taught, markets must be developed where now apples are almost unknown. Apples are served in 197 ways, and are creators and preservers of physical health and beauty, giving us a line of selling talk no other fruit on earth can claim.

Mr. Gilbert, of Richey & Gilbert Co., a prominent factor in the box apple business of the Northwest, sailed from San Francisco on February 26, 1913, on the mission of studying the prospects of marketing American apples in all the lands of the East. In his report he says, "Some power should arouse us to our duties in the Orient, the possibilities of our expanding markets there are beyond measure."

Gentlemen, we have not yet begun to take advantage of the possibilities of *our own markets*, and yet we hear the cry "overproduction." Overproduction! I have no patience with those short-sighted, narrow-minded Americans who think there can be a restricted demand for apples, the greatest fruit God has given to man. The demand can always be made to take care of the production, if the marketing problems are met with the broad-minded spirit that is in keeping with the importance of the industry.

Wrigley spends twenty-five per cent. of his gross receipts in advertising. Twenty-five per cent. of the gross sales of apples

would give twenty millions for advertising. One-half of one per cent. would give a fund sufficient to insure a profitable market for every apple grower, and yet we fold our arms seemingly content to snatch a profit from every second or third crop, and then profitable, chiefly because disaster has overtaken some other orchards.

Some say apples need no advertising, that every apple finds a market. True, but that market is often found at great sacrifice in prices. A letter I received from a lady in Long Island, gives an idea of the point of view of some consumers. In her letter she says: "Why spend money to advertise apples? simply lower prices so consumers can afford to buy all they want." And right along that line a great educational campaign must be waged, for consumers must be taught that it costs money to produce the kind of apples demanded at present, taught that cost of labor, material, package and freight is higher, taught that the cost of distribution as now demanded by consumers, is greater than ever.

The day of the old farmer hauling a few bushels of knotty, diseased, bruised apples to market in old sacks, is past. That man could afford to sell his apples at fifty cents per bushel, not so with the apple of commerce to-day. Why, gentlemen, if you made me a present of your apples, they could not now be sold at retail in the Baltimore market in March, for less than thirty-five cents per peck. I would have to pay forty-five cents for barrels, forty cents for gathering and packing, ten cents hauling, twenty-five cents freight, fifty cents storage, twenty-five cents to make sound, another hauling charge of five cents, twenty-five cents for my jobbers profit and they cost the retailer over twenty cents per peck. He in turn cannot keep up his present up-to-date establishment and sell apples at less than fifteen cents per peck profit. That's what they would cost if apples were absolutely given away by the grower. So when apples are retailed in the spring at less than fifty cents per peck, someone, either producer or speculator, is losing money.

Notwithstanding the kick against high cost of apples, they are in reality, the cheapest fruit grown—because they are the best. More food and health satisfaction may be obtained from \$1.00 worth of them, than from \$1.00 spent in any other fruit. You readily see the great work necessary to remove all these prejudices from the minds of consumers.

Apples must combat the aggressive advertising campaign now being waged by the orange, grapefruit and pineapple interests; 50,000 carloads of California oranges must and will be marketed. Ten million boxes Florida citrus fruits will be sold in competition with apples. Can we afford to sit idly by and view with equanimity the displacing of the king of fruits by these others? One concern in California has appropriated \$250,000 to spend this season to increase sale of their oranges. They are telling the people, oranges have no equal in health giving properties. If we are silent about apples, what will be the result?

Notwithstanding that funds available were meagre, our committee accomplished much, especially its work for "Apple Day," the third Tuesday in October. We secured hundreds of splendid editorials and press notices, which had the effect of greatly increasing

the sale of apples. As Mr. Wagner, of Chicago, wrote, "We gave an impetus to the consumption of apples on that day that will be felt throughout the entire season."

Our "197 Ways" to serve apples has met with a demand we cannot keep up with. Requests for copies have been received from every state in the Union, from Canada, Europe, even Hawaii and far off Australia.

Some of you recall the disastrous apple season of 1896, when thousands and thousands of barrels in February and March, were sold at less than \$1.00 per barrel. Many did not realize how complete the disaster was until they had finally sold or given away the last of their holdings, then they asked, "What happened to apples?" which reminds me of the story of Olds and his friend. The two were walking on a railroad track when Olds was killed. His companion was asked at the inquest to give his version of the accident. He said, "We were on the track when hearing a train behind us, I stepped to one side—the train passed and I saw nothing of Olds. Walking a little farther I saw a leg—farther on I saw an arm—still farther I saw Old's head, and then I realized something must have happened to Olds."

No trouble can come to our business if we use common sense and take advantage of means within our reach, to prevent disaster.

The question then, gentlemen, is not one of how to advertise, for that bridge must be crossed when we come to it, but the question is, How to raise the necessary funds? The answer is: "The Stamp Plan." This idea, since its inception, has been discussed by representative growers, shippers and dealers from coast to coast, and from none of them has aught but favorable indorsements been heard.

It is also necessary that the expense of the advertising shall be equitably distributed among all who will profit by the advertising, so that each will give in a just proportion to the benefits he will individually receive. "The Stamp Plan" admirably solves these problems, providing the funds by a method that will scarcely be felt by any grower or shipper, while bringing him, through increased sales, profits that will richly repay the expenditure.

What the "Stamp Plan" Is.

The plan is patterned after the method used by the various governments when it becomes necessary to raise large funds. The Spanish-American War, for instance, was financed by our government through special stamps placed on checks, drafts, etc.

The details of the plan are as follows:

The stamps are issued in two denominations—one cent and two cent. On every box of apples a one cent stamp will be placed, and for every barrel a two cent stamp will be used. The man who has fifty packages to market will buy fifty stamps, while he who has 1,000 packages will buy 1,000 stamps, etc.

The entire issue of stamps will be in the custody of the Equitable Mortgage & Trust Co., of Baltimore.

This trust company, through the many banks that are its agents

in the various sections of the country, will sell the stamps to every grower, shipper or dealer who applies for them. The stamps can be bought in person or by mail. The money derived from the sale of stamps will be placed by the trust company to the credit of the advertising fund.

While the expenditures for advertising will be under the direct supervision of a duly authorized advertising committee, prominent growers and shippers representing every apple growing district will act as an advisory board.

The committee will also have the advice and assistance of advertising experts of unquestioned ability.

The fund will be drawn on only through checks or drafts signed by three duly authorized officers, and countersigned by the chairman of the advertising committee.

What the "Stamp Plan" Will Accomplish.

It will provide the means for carrying on a continuous, country-wide advertising campaign, through newspapers, magazines, printed matter and other media, that will acquaint the masses of the United States and Canada with the great food and health-giving value of the apple; with the fact that it is open to a wider range of uses than any other product, easily prepared, easily digested, and appetizing to all; and with the further fact that, when brought in substantial quantities, it is one of the most economical foods.

It will furnish the money for an educational propaganda among retailers, convincing them that moderate profits and many sales, is in the end the most profitable policy. The achievement of this end will in itself, remove a great obstacle to the widespread consumption of apples.

It will obviate the necessity of making repeated appeals for funds to advertise the successive crops. It should bring to each apple producer, through the increased demand for apples, profits that will richly pay him for his contribution.

It will forever settle the question as to the amount it is proper for any one individual to contribute, since it provides that each man shall contribute in proportion to the size of his output.

By relieving in a great degree the burden of moving the successive apple crops, it will enable those engaged in the apple industry to devote more time and energy to solving such other problems as confront the trade.

Just as soon as the trade is assured that an efficient advertising campaign is to be conducted, buyers will invest in apples, with less fear of unprofitable results.

One of the saddest blows in life is that received by the grower, who after all his toil, trouble and anxious waiting, has to face complete loss on account of a crop freeze or similar disaster, but saddest of all is the blow to the man, who, having grown a fine crop and escaped freeze or disaster, but whose *net returns* are insufficient to pay the cost of his packages. This blow is preventable and it is our fault if it ever falls again.

Editor's Note.

The following paper has been contributed by a member living in Arkansas. It is printed at this time for two reasons: First, The subject treated is important and along the lines of inquiry in our recent meeting. Second, Many of our members will be interested to note the difficulties that must be overcome by the apple growers of the middle west.

CROSS POLLINATION OF APPLES.

The Relation to Selection of Varieties and Its Effect Upon the Apple Crop.

CHARLES S. BOUTON, *Springdale, Ark.*

The factors that make for success in orcharding are many and varied. For the purpose of emphasizing the particular subject of this paper, I wish to enumerate some of them as follows:

1. The personal factor. Some men succeed where others fail. All of us think we are fit. Are we?
2. Location. This includes selection of a site adapted to apples, with good air drainage, water drainage and convenience to market.
3. Soil. Character and texture, water holding capacity and methods of cultivation.
4. Proper use of fertilizers and soil builders.
5. Pruning, including how not to do it.
6. The climatic factor, including rainfall and temperature.
7. Parasites and the knowledge of how to fight them.
8. Proper selection of varieties.

It is difficult to say which of these factors makes most toward success or failure, but it is certain that very many failures are due to improper selection of varieties. You may cultivate, prune and spray to the very acme of perfection, you may have good soil, fine markets, first class air and water drainage, you may turn under crops of rye, cowpeas or clover, you may add to your land lime, wood ashes, tons of stable manure, and thousands of pounds of the best commercial fertilizer, and yet you may fail from lack of knowledge and judgment in the selection of varieties.

In a former paper on the subject, "A Logical Selection of Apples for Growing in the Ozarks," I endeavored to emphasize the importance of proper selection of varieties, showing among other things the *necessity* of selecting varieties climatically adapted to our locality and the advisability of choosing varieties which are self-fertile, or good pollinators or easily susceptible to cross pollination. It was impossible to give much more than passing notice to this latter branch of the subject at that time, but in this paper I want to point out the advantages of cross pollination and a few of its results.

Dean L. H. Bailey, in his "Principles of Fruit Growing," published in 1905, says: "There is very little positive knowledge concerning the inter-pollination of fruits, and no subject connected with

pomology is in greater need of study. We chiefly know that the most productive orchards are usually those of many varieties, and that some varieties sometimes refuse to fertilize themselves. The safest practice, therefore, is to plant no more than two or three rows of any one variety, together, of fruits in which self-sterility is a frequent characteristic. The chief point to be observed in selecting the varieties is that they shall bloom together. All pears and apples, and nearly or quite all plums seem to be inter-fertile when they bloom simultaneously."

The last sentence needs revision. Since 1905 an immense amount of evidence has been collected, which shows conclusively that many varieties that bloom at the same time are anything but inter-fertile. I have in my orchard a tree of the Summer Queen type. I think it is a William's Favorite. This tree is a wonderful bloomer, the equal or superior of the Mammoth Black Twig in this respect, and like the Black Twig its stamens produce pollen abundantly. Within a radius of fifty feet of this tree, there is a Belleflower, several Milams, several Ben Davis and a Minkler, all of which bloom at practically the same time as does this tree. The tree is healthy, and is capable of bearing six or eight barrels, yet I do not think I have ever gathered as much as three bushels from it in any one year. Some of you may say "I'm not interested in William's Favorite. I've got a good Ben Davis orchard with enough Winesap and Black Twig in it to help out the sale of the Bens." All right, let us bring the subject right up to where it touches you. Prof. C. S. Crandall, of the University of Illinois has been experimenting along these lines for several years. One year (1911, I think) the Ben Davis trees were blooming quite full. He took twenty-four clusters, emasculated the blossoms, covered them with sacks, then twenty-four hours later took the sacks off, and supplied Ben Davis pollen: to another group of twenty-five clusters he supplied the pollen of Grimes Golden, to another Rome Beauty and to another Winesap. Listen to what he says: "The results were quite different. Where we fertilized exclusively the Ben Davis flowers with Ben Davis pollen, not a single fruit set. Where we used Winesap pollen we had seventy-four to one-hundredths of one per cent. (less than one in a hundred). The Rome Beauty was between seventeen and eighteen per cent.: Grimes Golden between twenty-one and twenty-two per cent. There seemed to be quite a difference. These experiments were performed at Flora, Illinois. Some of you know Mr. W. S. Perrine, of Centralia, Illinois, a real thinking grower. Here is what he says: "The Winesap is the weakest (in pollen) of any we have: Ben Davis comes pretty close next. Ben Davis is a very poor self-pollenizer. Thirty years ago conditions seemed to be such that it bore very well, but we all know that in the last ten or fifteen years the Ben Davis is a very poor setter."

Centralia and Flora are both in the Ozark Hill section of Southern Illinois, where the soil, the climate, the length of season and other conditions are very similar to what we have here. We may be fairly certain that what is true in Southern Illinois is true in the Ozarks of Missouri and Arkansas, where differences in ele-

vations are not too pronounced. It does not follow, however, that because a variety is self sterile in one section of the country that it is necessarily so in another section. In fact, there are many exceptions. Take Ralls (or Geniton) for instance. Lewis and Vincent in their experiments made in Oregon in 1907 and 1908 report it as a self sterile variety. There it blooms at the same time as most other varieties. Here it is the latest bloomer we have, and generally it does not bloom until all the other varieties, including such late bloomers as Yellow Horse and Rome Beauty have set their fruit. There is no chance for it to be cross-pollinated and yet it is a heavy bearer with us. But in the matter of the Winesap and the Ben Davis, it is worthy of note that Lewis and Vincent report the Winesap as self sterile and Ben Davis as nearly so. The New York experiments show much the same results.

Here then, we have this situation confronting a large number of our Ozark growers. In the orchards set out between 1890 and 1907, it is safe to say that 80 per cent. were Ben Davis and Gano, about 10 per cent. Winesap, and Black Twigs, and the remaining 10 per cent. represented a host of other varieties, perhaps one-half of which were Collins Red, fortunately a self-fertile variety. In other words, nine out of every ten trees set in this period were self-sterile or nearly so, and much sadder to relate, they were usually set out in solid blocks. Is it any wonder that the ratio of bushels produced to acres planted is as low as it is in the Ozarks.

Before we come to the remedy for this particular condition, I want to take up another phase or two of the subject.

In determining the best pollenizers for any variety it is essential that a close study be made of their mutual affinities. The potency of the pollen of the pollenizer on the pistillate plant must be ascertained. Also the action of the pollen of the pistillate plant on the pollenizer should also be known, before deciding which variety is the best pollenizer for some of the commercial varieties.

To illustrate: In the experiments of Prof. Crandall hitherto mentioned, the Ben Davis was used as the pistillate or female in every instance. It was found that the Winesap was a poor pollenizer for Ben Davis, but it was not found what kind of a pollenizer Ben Davis is for Winesap. I suspect it is effective. But even if it is, Winesap is the only gainer. The trees should be inter-fertile, and at the time of planting should be so known to be.

We should also understand something of the many other factors that enter into cross-pollination. The receptivity of the stigma is one. The stigmas are covered with a viscous or sticky fluid, to which the pollen shed by the anthers, or carried by bees and other insects, adheres. When the flowers open on bright warm days, the stigmas of most varieties exude this viscous fluid in abundance; on the other hand, when the flowers open in cloudy weather and in low temperature the exudation is hardly noticeable. The anthers of the stamens are similarly affected. While they will open in cool weather, they do not take their usual erect position and thus do not shed their pollen in a normal way. Add to the phenomena just mentioned the fact that the bees, the principal cross-fertilizing agent, do not fly on wet or cold days, and it can be readily under-

stood why sunshine and warmth are so essential to the setting of the fruit crop.

Another thing of interest is the viability of the pollen. Under certain conditions pollen has retained its ability to fertilize for ten days after the flower has opened, and this is nearly the length of the average blooming period of the apple. If under the same conditions, the stigmas have retained their receptivity, it is possible for trees to set a good crop even where a week of bad weather has intervened since blooming began. Such a possibility is slight, however.

The bee has been spoken of as the principal cross-fertilizing agent. Lewis and Vincent made some interesting experiments with glass slides 1 x 3 inches, covered with vaseline and placed on the leeward side of trees in full bloom. At fifteen feet distant from the tree, eight grams were caught, at twenty feet six grains. The conclusion is obvious that the wind can not be relied upon as an agent for inter-pollination. In another experiment they removed the corolla, or floral part, from all the blossoms on a tree. Only one in three hundred set fruit. Only eight bees were observed visiting the tree during the blooming period. On a tree in full flower only twenty feet away, over double that number were seen in half an hour. Here we have a partial explanation of why a tree from which a wind and rain storm has carried the petals off of the flowers sets so little fruit. The bees are attracted by the inflorescence; a tree lacking that quality is rarely visited. When the bee is so attracted, in trying to reach the nectar, the hairy parts of the insect brushes against the Anthers, and quantities of pollen adhere thereto. In visiting other blossoms some of this foreign pollen is transferred to their pistils. Tame bees, wild bees, and other insects aid in this work.

In the first part of this paper I have depicted some conditions that unfortunately are not rare. What is a man going to do who has bought an orchard in which the several varieties composing the orchard are set in solid blocks, and which is not bringing the returns which his care and attention warrant? We will suppose the orchard is Ben Davis. First, plant resets of an early bearing, good pollinating variety. I would suggest Grimes. Next, if the orchard is over ten years old, top work with Grimes or Jonathan or with both the third tree in every third row. Thus, row 1 would have every third tree Jonathan, rows 2 and 3 would be Ben Davis, row 4 would have every third tree Grimes, rows 5 and 6 solid Ben Davis. and so on.

Jonathan and Grimes are suggested because both are good self-pollenizers here and both are good pollenizers for Ben Davis. Further their spraying dates, with the occasional exception of the spray following the dropping of the bloom, can be made identical with that of the Ben Davis.

For economy in harvesting it is also best to select for cross-pollination varieties which ripen at about the same time. This is the objection against planting summer apples with winter varieties.

If the solid orchard is (say) six to ten years old, the number of top grafted trees can be profitably increased. If less than six

years old it would be advisable to alter solid rows, and in setting out, perhaps the best plan is to have four rows of the main variety flanked by two rows of one variety on one side, and two rows of another on the other side. Three varieties give still better results than two where all are inter-fertile.

Now we come to the last thing to be considered herein, viz.: the effect of cross-pollination on the apple yield. The first experiments in this field were made by Waite in 1894, and Fletcher and all other investigators since that year have joined Waite in declaring that the usual effect is to increase the size of the fruit. It also tends to preserve regularity in the shape of the apple by increasing the number of sound seeds. Self-pollinated apples are usually deficient in seeds and where the ovule in a cell has not been fertilized that part of the apple adjoining is often stunted. The flavor is not changed in cross-pollinated fruit. It is of course possible that if seedlings should be grown from the seed of these cross-pollinated apples, some of them will produce fruit which will blend or unite the flavors of both parents. An immense amount of work, in the hope of procuring such desirable crosses, is constantly being done.

There is one more effect claimed for cross-pollination by such experienced and practical growers as W. S. Perrine and Senator Dunlap of Illinois. Speaking on the subject of orchard heating, the latter uses these words: "There is another protection that we can give our fruit, and that is cross-pollination. Cross-pollinated fruit at blooming time has a greater vitality than that that is self-pollinated. That that is true, I have seen demonstrated in my own orchard and in other orchards and there is not any doubt about it at all. It is just as positive as any statement and can be made in horticulture, that in cross-pollinated fruit you have a stronger fruit bud than you have in any other way. So if in addition to the thorough spraying and cultivation of the year before, the buds have cross-pollination we can resist frost conditions unless they are severe."

Summing up then, we find that by cross-pollination more blooms set, when set, they are more resistant to adverse conditions, the apples produced tend to be more regular in shape, and hence run less to culls, and finally, in the great majority of cases are larger. Is there any question but what the crop of good apples is multiplied.

Question Box.

This department was conducted by Dr. J. P. Stewart who received the questions and assigned them to members in the audience, himself assisting in the discussions. It proved to be a most interesting feature, filling one whole lecture period on Wednesday afternoon and a similar time on Thursday forenoon. Following are the most important discussions:

Question.—*What can you say about Delicious and King David apples as grown in Pennsylvania?*

T. J. Frederick, Spring Church.—About ten years ago I sent to the Stark Bros. Nursery Company for some apple trees. Among others I ordered two Delicious and as many King David. They all grew. The Delicious have been bearing for three or four years. I sent one bushel and a plate to the Apple Show in connection with the Meeting of the State Horticultural Association at Pittsburgh in 1912. I saw them on exhibition there. The Stark Bros. had some of their Delicious there and my judgment led me to believe that my apples compared quite favorably with theirs. I can say that this apple with me bears well, that the tree makes a good growth and that the apples keep well to mid-winter. It is perhaps the finest dessert apple grown. This seems to be the universal verdict of those here who have been so fortunate as to eat it. I am sorry now I did not plant five hundred trees.

For the King David I cannot say much. If the trees which I planted for King David are true to name then I am not sorry I did not plant more of them.

Walter J. Shearer, Vinemont.—I have fruited Delicious and find it a good eating apple and a good bearer, but it is not one of the best keepers and has the tendency of ripening or getting soft at the core.

Levi M. Myers, Siddonsburg, Pa.—My experience with Stark Delicious has extended over three years of fruiting on young trees and grafts.

The fruit is of excellent quality, ripening with Baldwin and Grimes Golden perhaps remaining on the trees a little better than Baldwin.

As grown in York County the fruit attains a good size and has plenty of color making it an ideal early winter apple. My trees, being young, have not fruited very heavily. The tree is a vigorous upright grower and seems to have the qualities of a lasting tree.

H. H. Laub, Jr., Lewistown, Pa.—The Delicious tree is a straggling but hardy grower, early and annual bearer.

The fruit is of a high quality. Size and shape similar to that grown in the Western states.

In color it is more highly mottled with a deeper crimson.

The skin is rather tender and therefore very susceptible to bruises and should be handled exceedingly careful,—in fact it is best suited for a fancy fruit package, and the fruit will measure up well to that standard.

When not too ripe the flesh is juicy, highly flavored, light sub-acid, peculiarly delicious, (only known to that individual variety), sure to please the taste of the most exacting epicurean critic.

Have found that it is very apt to ripen up early under ordinary storage conditions and when dead ripe becomes very mealy instead of remaining firm like the winesap varieties.

As a whole, I believe it will prove a profitable acquisition to my orchard in a few years time.

Am pleased with it thus far, though my trees only being eleven years old, cannot say what it may develop later.

Have not grown any King David apples and not knowing anything about that variety from personal experience, I am not in a position to express an opinion at this time.

Dr. J. H. Funk, Boyertown.—As to my opinion of the Delicious apple I hardly know how to answer. Had you asked me three years ago I would have said I do not know. One year later I would have placed it in the foremost list. Last season puts me again in doubt. In the year 1911 I had my first crop on top worked trees. The crop was light but the fruit was very fine and quality good.

In 1912 the same trees were heavily laden with a full crop of as fine apples in size, color, and quality as the finest from the famed Oregon growers. I sold my crop at \$1.50 per bushel from the trees as they ran. Last season, 1913, the same trees had a very light crop of very poor quality. Scarce an apple that could be classed as first grade. So I hesitate to pass on it, but I am still inclined to believe it may still make good. But I do not believe it will ever compete favorably with the Stayman. As to the King David. I have it bearing four years, and I would say go slow in planting. It is a heavy and early bearer, of very dark red apples of good quality. But the fruit is too small, and has some serious faults, one being subject to rot inside, fruit will look perfect outside, and inside unedible. I consider Jonathan much preferable as a commercial apple. But Stayman, Winesap, and Rome Beauty are my best money makers. Trusting this will answer your inquiry satisfactorily I remain.

John G. Engle, Marietta.—My Delicious nearly failed the past summer and the few scattering fruits were badly marked with summer spot. (A few other sorts were just as bad.) would advise limited planting of Delicious for home use or commercially.

My Jonathan, Grimes Golden, York Imperial, Rome Beauty, Stark, and Sutton Beauty surpassed the Delicious in every way.

David S. Blessing, Harrisburg.—I have fruited King David and find the tree a strong and vigorous grower. As to its bearing qualities it excels or at least equals York Imperial. Last year I had trees loaded to the ground even after what I thought had been a severe thinning. Their size was medium, probably due to their overloaded condition. In color I never saw anything more beautiful in the apple line; it is susceptible to a very high polish. I have seen and tasted the western King David but the apples I had were I thought better colored, better quality but not so large. Another good quality I noticed, they are most tenacious stickers and winds do not blow them off; in fact they are a little hard to pick on that account and fruit spurs are liable to be pulled off if not careful. Last year I left them hang a little too long and this I think impaired their keeping qualities. Now for the faults, of which I found two. First, it is susceptible to the "Jonathan Spot."

Second, in common storage its keeping qualities are not good as it is subject to core rot. This latter fault may be due to the fact of picking too late and not hurrying to cold storage. I should have picked them ten days before I did and next fall I am going to see if earlier picking will prevent the core rot.

None of my Delicious have fruited yet but the trees are strong and vigorous growers.

Question.—Name five best peaches for your own section of Pennsylvania.

Edwin W. Thomas, King of Prussia.—(For Southeastern Pennsylvania.) In answering this question, we take it for granted, that it is meant for commercial planting. We would select productive and good shipping varieties, extending through the entire fruiting season, commencing with Carmen, then Belle of Georgia, Elberta, Fox's Seedling, and Smock Free or Iron Mountain.

Of this list the Elberta and Smock Free are the only yellow ones. We especially like the Smock for a late peach, perhaps its greatest fault is that it is liable to overbear, then it ought to be thinned to get best results. If everybody could appreciate the merits of the Smock, it would doubtless be more extensively planted than it is. Although a dry peach, ripening late, when the demand for peaches is always greatest, for canning it is one of the most desirable. Also for use in making ice cream and for slicing with sugar and cream it is excelled by scarcely any others.

For family use, or for a commercial orchard we would not limit ourselves to five varieties, we think many of the good old standard sorts, ought still be retained in any collection of general planting, varieties that have been thoroughly tested and not found wanting. In such kinds we would include Troths Early, Champion, Mountain Rose, Stump the World, Old Mixon Free, Reeves' Rariper, Favorite, Ray, Crawford's Late, Red Cheeked, Stevens' Rariper, etc. For quality and productiveness these are mostly all right, the chief objection to some of them would be that they ripen at a season when the market is more likely to be glutted. We certainly would avoid the planting of new varieties to any great extent, until they have been carefully tested in the locality where wanted, we care not how much money is being spent in advertising them.

We would also discourage the planting of varieties with high-sounding names, or those named for some supposedly great men. In this connection we might mention the Triumph, from its name we would naturally infer that it had scarcely any superiors and few equals, yet we consider it absolutely worthless.

We are inclined to think in making a selection to plant especially on an extensive scale, that it might be well to follow the old maxim:

"Be not the first by whom the new is tried
Nor yet the last to lay the old aside."

Levi M. Myers, Siddonsburg.—When you ask for the best

peaches for Southern Pennsylvania, I presume you mean for commercial planting.

I would select the following varieties in order of ripening: Carman (white), Belle of Georgia (white), Elberta (yellow), Chairs' Choice, or Improved Crawford (yellow), Fox's Seedling (white), Geary Holdon (Yellow).

There are many other good varieties but for season of ripening hardness and productiveness the six above named varieties alone cannot be excelled.

Question.—What do you know about the J. H. Hale Peach?

Prof. H. A. Surface, Harrisburg.—For three years the J. H. Hale peach has come to me exactly at the time of ripening of my late Crawfords. In appearance, color, size and roughness of pit and in all regards I regard it as indistinguishable from Late Crawfords, and in addition to this it is certainly the most sour peach I ever ate. Also I would like to know how the report of the originator claims to have improved it when he says he found it as a chance seedling. How can one improve a seedling? He can propagate it but I should like to know how he could improve it without growing other seedlings from it and attempting to select the best of these. Personally I prefer the Late Crawford for quality and of the specimens of the Hale that I have seen I can also say that the Crawford is fully as large and as well colored.

P. S. Fenstermacher, Allentown.—While visiting Hale's orchards at Fort Valley last summer, Mr. Hale remarked that it was a light bearer in the South. Have no definite information as to its bearing qualities in the North. I would advise very light planting if any of this variety. Let the people who have money to burn do the experimenting.

Question.—Does Lime-Sulphur deteriorate by standing or by freezing?

Prof. H. A. Surface, Harrisburg.—I have kept lime-sulphur solution for four or five years during winter and summer without freezing by standing. I made it by boiling it in a boiling room during bad weather and put it into open barrels and cover these with oil cloth held in place by hoops fitted over the tops of the barrels, or by a pint of common kerosene oil poured over the Lime-Sulphur solution. The oil will do no harm but it is really not needed. Even if the Lime-sulphur Solution is not covered it will not deteriorate much. It will simply form a thin film or pellicle over the surface of the liquid where the air comes in contact with it, which will break up in flakes and sink when disturbed. The only objection to this is that it necessitates straining the liquid or the little solid particles are liable to clog the nozzles in spraying. We have advocated this method of covering and protecting Lime-sulphur Solution during the past seven or eight years as it is well known that we were among the very first persons in the

eastern part of America to use and recommend this material, and especially to prove the relative values of the different brands of commercial Lime-sulphur Solution, and that home-made material can be made of the same strength and composition, and also to prove the effects of carbolic acid gas in gas sprayers disintegrating this material.

Question.—Is the heating of Orchards practicable in the East?

Wm. Brinton, Glen Rose.—To my mind there is no question of the practicability; it is simply whether for the infrequent seasons when it may be needed it will pay in time, worry, and money to bother with it. The worry is the largest item to be considered for unless you have an automatic frost alarm you will lose much sleep watching the thermometer frosty nights every spring.

In the orchards here last season we feel absolutely sure that we saved a \$3,500-crop of peaches on 8 acres with 200 Hamilton heaters and 10 or 12 bbls. of oil burning 2 nights. Temperature was raised at least 8 degrees and outside the heat zone there were no peaches and no other orchard in the county so far as I know had any peaches of any account.

Samuel Swartz, Spring Grove.—Though my experience is limited to one season in orchard heating, yet by the following report I believe it practicable in the east. In the season of 1913 I had three acres, Northwestern Slope, trees three years old. The temperature fell to 26 degrees F. Trees were in full blossom.

Oil consumed cost,	\$59.78
50 per cent of total cost of equipment,	46.22
Labor,	6.50
	<hr/>
	\$112.50

Crop Saved, \$275.00.

Prof. H. A. Surface, Harrisburg.—As a general rule I do not believe the heating of the orchards in the east to be practicable. Growers are too far apart and orchards are too large or too small for the heat to have beneficial effect that it has in regions like those of the west where there are many growers close together and their mutual efforts warm the air so that each may receive the benefit of the other's heating. Also, if it is a matter of heating to increase the temperature for only four or five degrees this may be done, but where the temperature is liable to fall to ten degrees or more below the safety point as it is frequently liable to in this region we cannot expect the heat to increase it enough.

Instead of artificial orchard-heating I much prefer to depend upon well-grown, healthy, wellfed and well pruned trees.

I know of persons who have successfully heated their orchards as in the case of C. S. Grieb, of Mill Hall by burning logs, brush, and damp leaves in his orchard, thus both heating and

smudging. He saved a valuable crop of peaches and was able to sell them at a fancy price because others in that region had none. He and his wife worked hard for three nights and were fully rewarded for their efforts. This, however, is a special case. I know, also, of a neighbor in sight of my own orchard who kept up large fires at considerable expense and produced no more fruit than did I who did not heat. I also know of others who heated their orchards by artificial means. This had no beneficial result. Some of my correspondents in the western part of the State are now purposing to heat by means of natural gas conducted into the orchard by pipes and this may to some extent be successful. This practice is in its infancy, or rather experimental stage and should not be discouraged, although beneficial results cannot yet be assured.

C. B. Grieb, Mill Hall.—In regard to smudge fires, they are all right. In the spring when in blossom we have saved our fruit different times. It is the smoke that eats up the frost. We make fires in different parts of the orchard and when we get a bed of coals we put on the saw-dust to smother the fire and that will make a large smoke and will keep on smoking and will eat up the frost.

Question.—With ten acres or more to spray, does it pay to make your own Lime and Sulphur solution?

Howard A. Chase, Mt. Pocono.—Yes and no. While the trees are young and one or two barrels of concentrated commercial lime-sulphur is all that may be required I would not, I think, take the time and bother with the home-made.

After that when a larger quantity might be required I would make it, provided I could give the making my personal supervision to insure it being properly made. In many instances I think the commercial article will give the best results.

John W. Cox, New Wilmington.—In order to answer the question "does it pay," one must take into consideration the cost of material, labor, fuel, and equipment and compare it with the cost of the commercial material. Powdered commercial sulphur can be purchased, delivered in any section of Pennsylvania for 2 cents per pound, or less. Lime will range in price from \$3.00 per ton at the kiln to about one half cent per pound by the barrel. One hundred and twenty pounds of sulphur, costing \$2.40 and 60 pounds of lime costing 30 cents at highest quoted prices, will make 60 gallons of concentrated solution testing from 1.15 degrees to 1.24 degrees of density, equivalent to about 1 barrel of commercial material that will test 1.30 degrees and costing about \$7.00. Deducting \$1.00, the value of the barrel from the cost of the commercial solution we have a difference of \$3.30 per barrel in favor of the home boiled solution.

On most farms there is an abundance of wood, for fuel, that will cost nothing but some labor for preparation. As this work can be done during the winter season when work is not rushing

and several barrels of the solution can be prepared in one day there are very few farmers or fruit growers who can devote their time to anything else that will give them as large net returns. I would say that with ten acres, more or less, of spraying it will pay well to make the home boiled lime-sulphur solution.

When the commercial material is purchased in large quantities and near the place of manufacture there will not be so much difference in cost.

P. T. Barnes, Harrisburg, Pa.—Ralph Trax, at Library, Allegheny County, has fifteen acres of fruit varying in age from 14 years down to trees planted last spring. This year he has boiled five barrels of concentrated lime-sulphur testing 1.250 specific gravity, which cost him as follows:

500 pounds ground sulphur, at \$2 per 100 pounds,	\$10.00
2 barrels lime at \$.91 per barrel,	1.82
	<hr/>
	\$11.82

There was some lime left over from the second barrel. These 250 gallons are about equal to 200 gallons of the commercial concentrated lime-sulphur, and the cheapest he could buy it at in this vicinity (Pittsburgh) is 15 cents a gallon—\$30.00 for the lot, a saving in actual money of \$18.18. For fuel a few old rails were used and a total of ten hours was consumed in the operation. These two items were not charged against the lime-sulphur; neither was the kettle which is owned jointly with a neighbor and which has been used for this purpose several years.

Question.—What is the cost of making a barrel of concentrated Lime and Sulphur? How do you arrive at the cost and what is the degree of density?

P. T. Barnes, Harrisburg.—It costs about \$2.50 a barrel to make a barrel of concentrated lime-sulphur, not including labor and fuel. This year we made 100 gallons using 200 pounds ground or commercial sulphur, costing 2.00 per 100 pounds, delivered at the freight station—Library, Allegheny County—and 100 pounds high grade calcium lime costing 91 cents a barrel delivered, which amounted to about 60 cents, making a total of \$4.60 for 100 gallons. A 65-gallon feed cooker was used. It took a heaping armful of split wood—old oak rails dash to boil a kettleful and required four hours to boil the two kettlefuls. It tested 1.250 specific gravity.

J. C. Willson, Wallisrun.—The cost of labor and boiling lime-sulphur may be reduced by having a good outfit for this purpose, especially where a large amount of concentrate is needed.

It is as easy to boil 40 gallons at one time as it would be a less amount and save in cost of labor and fuel by not repeating.

A number in Lycoming County are using a sixty-gallon feed cooker in which to boil their lime-sulphur.

Mr. W. H. Banzhaf, of Muncy, the president of the Lycoming County Fruit Growers' Association, was I believe first to give it a trial for this purpose in this vicinity. Mr. W. G. Winner, of Calvert, has one in use and I am greatly pleased with ours. We do not use it for anything else.

The cooker gives the maximum of heat with least amount of wood and it is surprising how little wood is required with no chance for waste by escaping heat.

It has a joint stovepipe, a door in front with a slide damper that aids in keeping uniform heat. An extra joint of stovepipe may be added should a greater draft be wanted. Wire screening may be used as a safeguard against sparks if high winds or in proximity to buildings.

The cost of home boiled lime and sulphur will vary some as cost of labor, materials, and fuel varies. With us fuel is not an item of cost.

The cost of 120 gallons of concentrate would be about as follows:

120 gals. water,	\$
240 pounds Sulphur,	4.20
120 pounds Lime,60
Labor, 1 day (hired),	1.50
	<hr/>
	\$6.30

If we perform the labor ourself we save the dollar and fifty cents as money not really paid out.

The degree of concentrate will vary at times, much depending upon good lime, high in calcium. Though our test be but 25 degrees a dollar's worth of materials more, or less water added in process of boiling would cover a variation of five degrees to stronger.

Question.—How often, when and with what preparation should peaches be sprayed for brown rot?

P. S. Fenstermacher, Allentown.—As the disease usually enters through injuries received from insects like curculio, spray with 8-8-50 self-boiled Lime-Sulphur and 2 pounds Arsenate of Lead as shucks fall, and again three weeks later. Late ripening varieties, three or four weeks before ripening, omitting the Arsenate of Lead.

Fred Ruof, Hummelstown.—For early peaches, two sprayings are generally sufficient, but it will depend on the weather. If there is much rain or damp weather, more spraying will be needed. For main crop peaches up to the middle of September, two sprayings are usually sufficient. For later varieties, where there is danger of peach scab, three sprayings will be required. In damp seasons, or in low spots, it will pay to give the third spraying, if only for scab.

J. A. Runk, Huntingdon, Pa.—I have seen brown rot effectively controlled in large peach orchards during the past two years by using self-boiled lime and sulphur (eight pounds of lime and eight pounds of sulphur to fifty gallons of water), making the first application about four weeks after the blossoms have fallen and the second application approximately five weeks before the fruit ripens. For late ripening varieties, a third application may be found necessary.

(The above treatment is the one which has been worked out and used so successfully by Dr. Scott of the U. S. Department of Agriculture.)

Question.—Explain the making of self-boiled lime-sulphur solution.

Prof. H. A. Surface, Harrisburg.—I make self-boiled lime-sulphur solution according to Scott's formula of 8-8-50. I put eight pounds of fresh stone lime into a barrel and stir eight pounds of sulphur in two or three gallons of water and pour this over the lime and let it commence to slake. I use just enough water to partially cover the mixture of lime and sulphur and by standing a hoe in the barrel I can stir it occasionally. I cover the barrel tightly with a blanket or oil cloth and let it stand from eight to ten minutes until the red liquid is just commencing to form in spots, then I add enough cold water to make up fifty gallons, stir it well, strain it and apply it thoroughly as a spray for brown rot or ripe rot.

REPORT OF RESOLUTION COMMITTEE.

To the officers and members of the State Horticultural Association of Pennsylvania, Your Committee on Resolutions would respectfully submit the following:

Resolved, That we heartily commend the important work in behalf of horticulture that is being done in this State through the medium of the Department of Agriculture, by the teachings of its farmers institute force and the splendid results achieved by its Division of Zoology.

Resolved, That in the Pennsylvania State College we have an admirable institution, the operations of which are proving a most valuable aid in enlarging the scope of agricultural and horticultural research.

Resolved, That we express our disapproval of the Act of Assembly which demands that fruits be sold at a greater weight for a supposed bushel than the actual weight of a full bushel, and that steps be taken by our committee on legislation to obtain such modification of that law as will be proper and equitable.

Resolved, That our legislative committee move in the matter of securing the necessary legislation for the regulation of the commission business in agricultural produce, and the providing for

protection against the unfair and dishonest methods of some commission men.

Resolved, That the Department of Agriculture of Pennsylvania be requested to prepare a bulletin, to be distributed throughout the State, suggesting the best methods of utilizing the waste products of the orchard, and especially with reference to the manufacture of vinegar, with an estimate of the cost of a convenient building and equipment.

Resolved, That we tender our thanks to the York Chamber of Commerce for the hospitality extended to our Association and their excursion trips so delightfully planned; to the Hon. John R. Lafean, Mayor of the city, for his hearty address of welcome, and to the newspapers of York for their excellent reports of our proceedings.

F. H. FASSETT,
CYRUS T. FOX,
A. I. WEIDNER,
W. J. LEWIS,
GEO. W. BARTRAM,
Committee.

THE FRUIT SHOW.

No premiums could be offered this year and only first and second ribbons were given but the loyalty of the members was well displayed in the quantity and character of the fruit displayed. There was not quite so much fruit as in the past few years but the quality was quite up to the mark. Perry County beat Adams to first place in county display with a showing of decided merit. Some folks say that Adams County was caught resting on her laurels and some say that Perry is coming right to the front in apple growing. Be that as it may, it will take some good fruit to win first place in the county display of the 1915 show. Because—and this is a secret—Adams County doesn't like second place one bit, while winning first suits Perry tip-top and this is not all: at least three other counties see possibilities in what Perry did and are inclined to take a hand. We prophesy that there will be "something doing" next year, and to tell the truth we shall be glad to see it.

The judges were Prof. S. B. Heiges, of Saxe, Va., Mr. Walter Scott of Cranbury, N. J., and Dr. J. P. Stewart, of State College. The following awards were made:

Awards.

CLASS I.—Single Barrel—Any Variety.

Stayman.—(1) H. M. Keller, Gettysburg, R. 5.
York.—(2) G. P. Myers, Aspers; (2) E. F. Kauffman and Son, York.

CLASS II.—Three Barrels—Three Varieties.

No entry.

CLASS III.—*Five Barrels—Any One Variety.*

(1) (Stayman) H. M. Keller, Gettysburg, R. 5.

CLASS IV.—*Single Box—Following List.**Baldwin*.—(1) Wm. Stewart, Landisburg; (2) Sharon Fruit Farm, Newport.*Ben Davis*.—(1) Wm. Stewart, Landisburg; (2) E. F. Kauffman & Son, York.*Grimes*.—(1) Tyson Brother, Flora Dale.*Rambo*.—(1) Wm. Stewart.*Rome Beauty*.—(1) Wm. Stewart; (2) T. C. Foster, Lewisburg.*Stayman*.—(1) Tyson Bros., Flora Dale; (2) Albert Shorb, Hanover.*Summer Rambo*.—(1) Tyson Brothers.*Winter Banana*.—(1) Wm. Stewart.*Yellow Bellflower*.—(1) Sharon Fruit Farm, Newport.*York Imperial*.—(1) Tyson Brothers; (2) E. F. Kauffman & Son.*York Stripe*.—(1) Wm. Stewart.CLASS V.—*Single Box—Any Variety.*

(1) (Smith Cinder) Sharon Fruit Farm.

(2) (Black Gilliflower) Daniel Rice, New Bloomfield.

CLASS VI.—*Three Boxes—Any Three Varieties.*

(1) (Grimes, York Imp., York Stripe) Tyson Brothers.

(2) (Ben, York, Stark) E. F. Kauffman & Son.

CLASS VII.—*Five Boxes—Any One Variety.*

(1) (Stayman) Tyson Brothers.

CLASS VIII.—*Single Plate—Following List.**Arkansas*.—(1) E. P. Garretson, Biglerville.*Baldwin*.—(1) Sharon Fruit Farm; (2) Miss Katherine Large.*Ben Davis*.—(1) G. P. Myers, Aspers; (2) Miss Katherine Large.*Grimes*.—(1) Miss Katherine Large; (2) Fred'k G. Satterthwrite, Fallington.*Hubbardston*.—(1) D. M. Wertz, Waynesboro.*Jonathan*.—(1) D. M. Wertz, Waynesboro; (2) C. A. Wolfe, Aspers.*Spy*.—(1) Fred'k G. Satterthwrite, Fallington.*Rome Beauty*.—(1) W. W. Brunner, Paxtonville; (2) T. C. Foster, Lewisburg.*Smoke House*.—(1) Tyson Brothers; (2) Fred'k G. Satterthwrite.*Stayman*.—(1) E. P. Garretson, Biglerville; (2) Tyson Brothers.*Summer Rambo*.—(1) Tyson Brothers; (2) Miss Katherine Large.*Wagener*.—(1) Tyson Brothers.*Yellow Bellflower*.—(1) Fred'k G. Satterthwrite.*York Imperial*.—(1) Miss Katherine Large; (2) Tyson Brothers.*York Stripe*.—(1) H. M. Keller; (2) Wm. Stewart.CLASS IX.—*Three Plates—Any Three Varieties.*

(1) (Stayman, Grimes, Y. Stripe), Tyson Brothers.

(2) (York, Famense, Flory Bellflower) Miss Katherine Large.

CLASS X.—*Five Plates—Any One Variety.*

(1) (Rome Beauty) Sunnyside Orchard Co., Tyrone.

(2) (York Imperial) Boyer Brothers, Arendtsville.

CLASS XI.—*Large Number Varieties.*

(1) (Twenty-one Varieties) E. P. Garretson.

(2) (Seventeen Varieties) E. H. Snyder & Sons, Jacks Mountain.

CLASS XII.—*Best Collection Pears.*

No Entry.

CLASS XIII.—*Single Plate.*

(1) (Clairgeau) Miss Katherine Large.

CLASS XIV.—*Display.*

No Entry.

CLASS XV.—*Nuts.**Black Walnuts*.—(1) L. C. Hall, Avonia.*Native Chestnuts*.—(1) L. C. Hall, Avonia.CLASS XVI.—*County Exhibit.*

(1) Perry County.

(2) Adams County.

TREASURERS' REPORT.

DISBURSEMENTS.

2-3-1913, to C. G. Woodbury,	\$ 73.77
2-3-1913, to Pub. House United Evangelical Church,	12.83
2-3-1913, to Samuel Fraser,	51.55
2-20-1913, to John D. Herr,	38.00
2-20-1913, to Times and News Pub. Co.,	20.50
2-20-1913, to Paul Work,	18.44
2-20-1913, to Whitehead and Hoag Co.,	13.00
2-20-1913, to H. B. Fullerton,	25.00
3-22-1913, to Harrisburg Board of Trade,	60.00
5-2-1913, to Whitehead and Hoag Co.,	7.17
5-5-1913, to Times and News Pub. Co.,	24.50
5-5-1913, to The Gettysburg Compiler,	12.00
5-5-1913, to Times and News Pub. Co.,	4.75
5-5-1913, to Wayen Title and Trust Co.,	2.50
1-19-1914, to Balance, Cash on Hand,	164.75
	<hr/>
	\$528.76

RECEIPTS.

Cash Balance 1st mo., 21st., 1913,	\$ 30.74
2-1-1913, from Chester J. Tyson, annual dues,	175.00
2-19-1913, from Chester J. Tyson, annual dues,	45.00
3-15-1913, from interest on life-membership fund,	13.09
3-22-1913, from Chester J. Tyson, annual dues,	70.00
5-5-1913, from Chester J. Tyson, annual dues,	50.00
5-5-1913, from Chester J. Tyson, annual dues,	18.93
1-15-1914, from interest on life-membership fund,	126.00
	<hr/>
	\$528.76

AUDITORS' REPORT.

YORK, PA., January 21, 1914.

We, the undersigned have examined the above account and find the same to be correct.

We also find the sum of \$700.00, the life-membership fund.

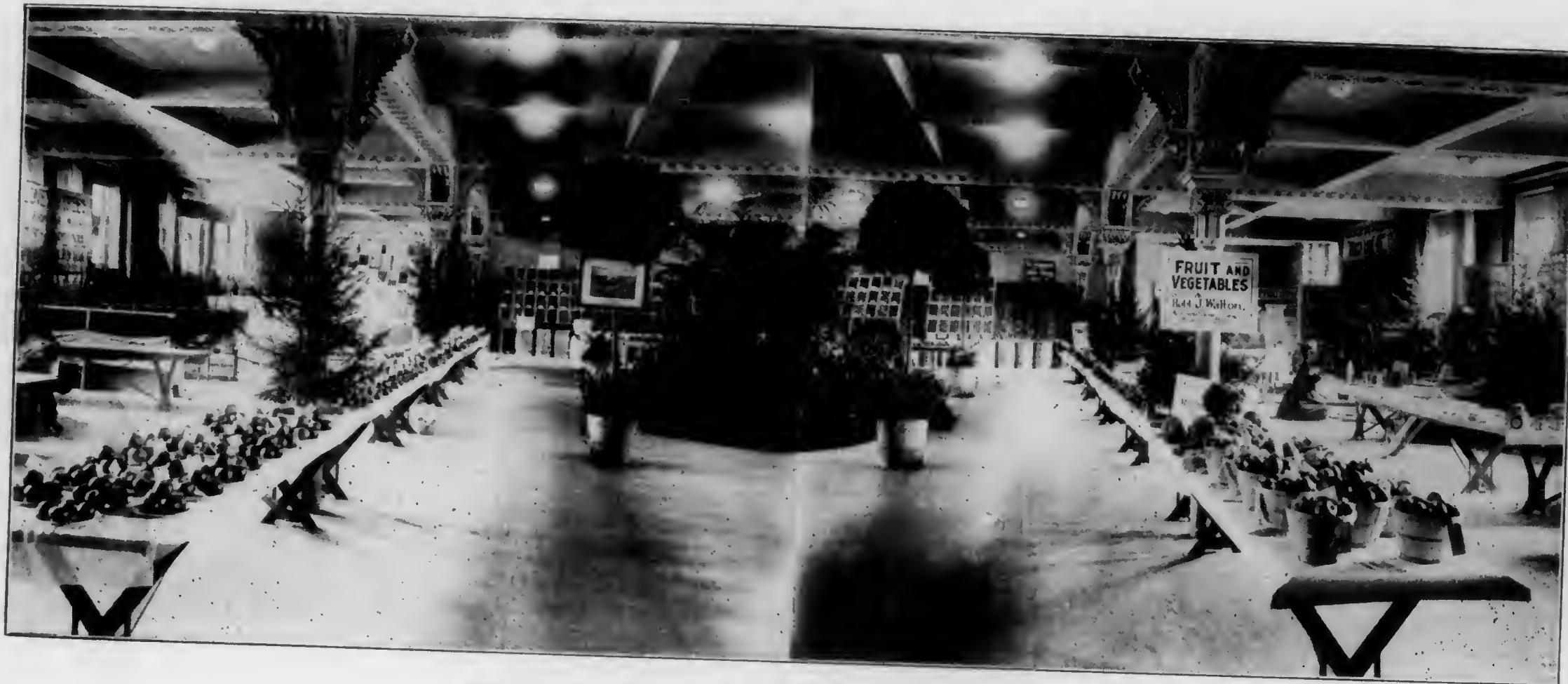
Wm. T. CREASY,
Wm. STEWART,
ROBT. M. ELDON,
Auditors.

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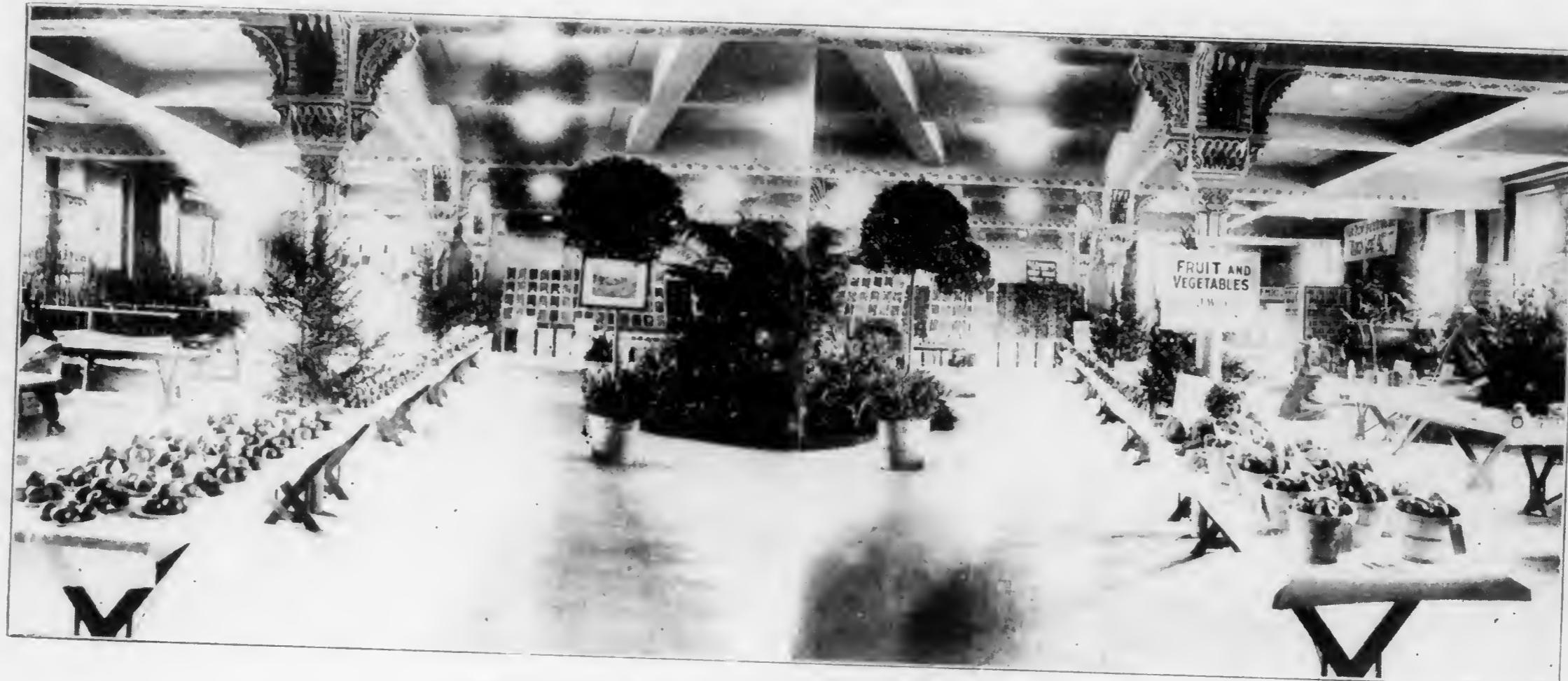
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FRUIT SHOW—IREM TEMPLE, WILKES-BARRE.

INTENTIONAL 2ND EXPOSURE



FRUIT SHOW - IREM TEMPLE, WILKES-BARRE.

END OF YEAR



**CONTINUED
ON
NEXT REEL**

**END OF REEL
PLEASE
REWIND**

